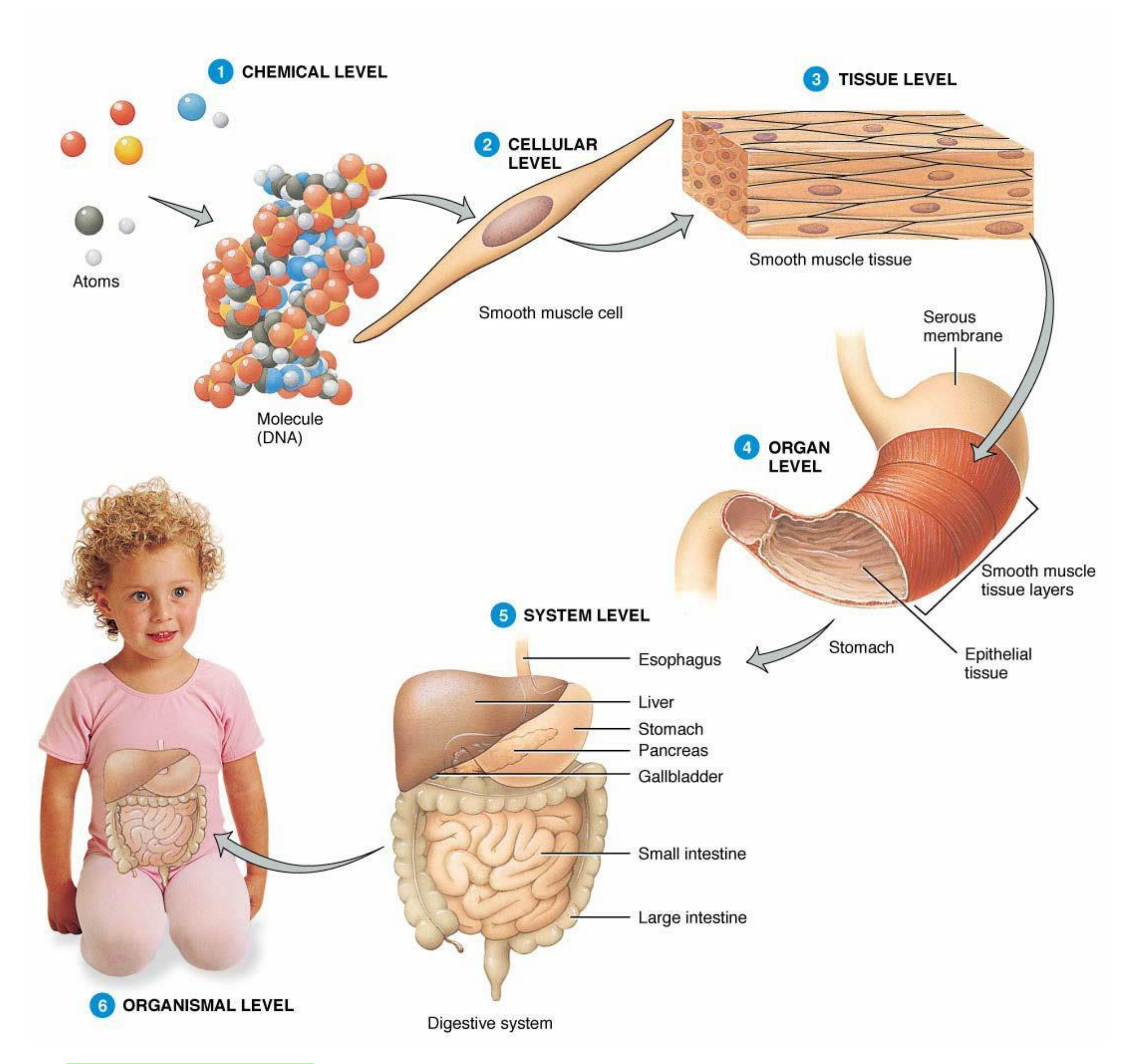
Chemical structure of living organism

- You know that the structure of higher living organism is represented by sequenced



- The human body

- Consists of a group of systems, each system consists of a group of organs (The organ level)
- Each organ consists of group of tissues (The tissue level)
- Each tissue consists of a group of cells (The cell level)
- Each cell consists of a group of organelles (The organelle level)
- Each organelle consists of a group of molecules (The chemical level)
- Each molecule consists of a group of atoms

- We find that the cells of the living organism are made up of :-

Organic compound	In organic compound
- They are large molecules. - Mainly contain carbon (C) and hydrogen (H) atoms. - May contain other elements, such as oxygen (O) andnitrogen (N). - They are called biological macro-molecules. Examples: Carbohydrates, lipids, proteins and nucleic acids.	They are molecules thatdon´t contain carbon (atoms) Examples: 1-Water ($H2O$) 2- mineralsalts (e.g. NaCl)

Biological macro-molecules.

- All of them contain carbon atom
- They are extremely necessary for the life
- Most of macro-molecule are called polymers that are formed by the combination of small-sized molecule called monomers through polymerization process (condensation process)
- They are classified according to their molecular structure and the function that they perform into four group

1	**Carbohydrates**
2	**Lipids**
3	**Proteins**
4	**Nucleic acid**

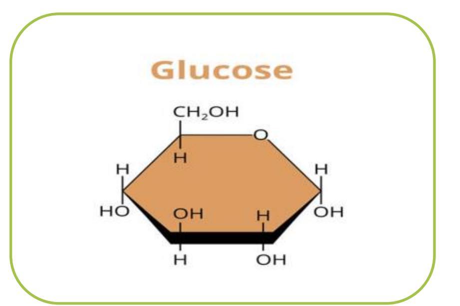
Each one of them consist of a different monomer for example:-

Polymer **monomer**

1-carbohydrates



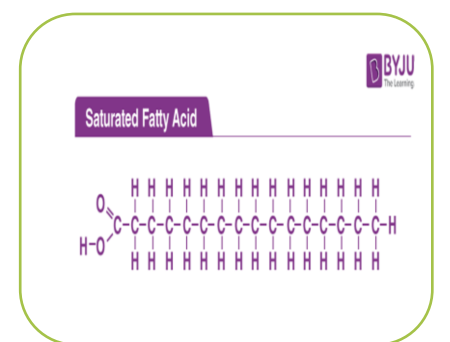




2-lipids



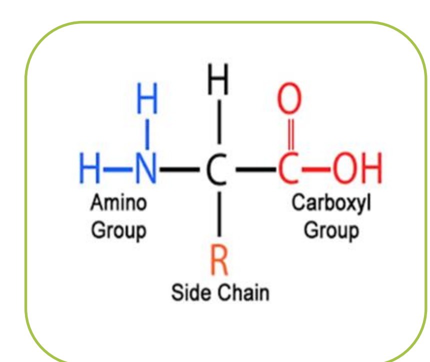




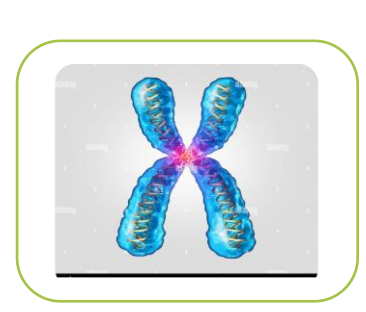
3-protein



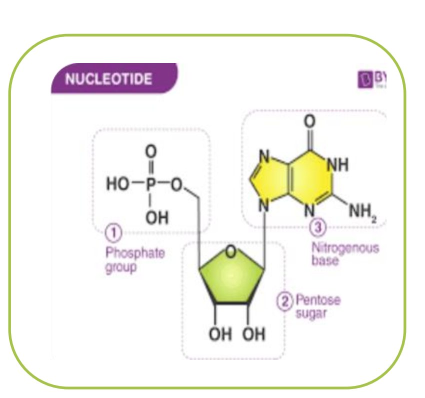




4-nucleic acid









Carbohydrates

A Carbohydrates are.....

1-They are biological macro-molecules (polymers) that are made up of many smaller molecules (monomers) called monosaccharaides

2-They include sugar, starches, and fibers

3-(CH2O) n this is the chemical formula of carbohydrates

So the molecule consist of carbon(c), hydrogen (H) and oxygen (o) atoms in a ratio) 1:2:1)representatively

B Classification of carbohydrates

Carbohydrates are classified according to their molecular structure as follows:-

1 Simple sugar

2 Complex sugar

1 Simple sugar

Properties of simple sugar:-

1-water soluble

2- Having a law molecular weight

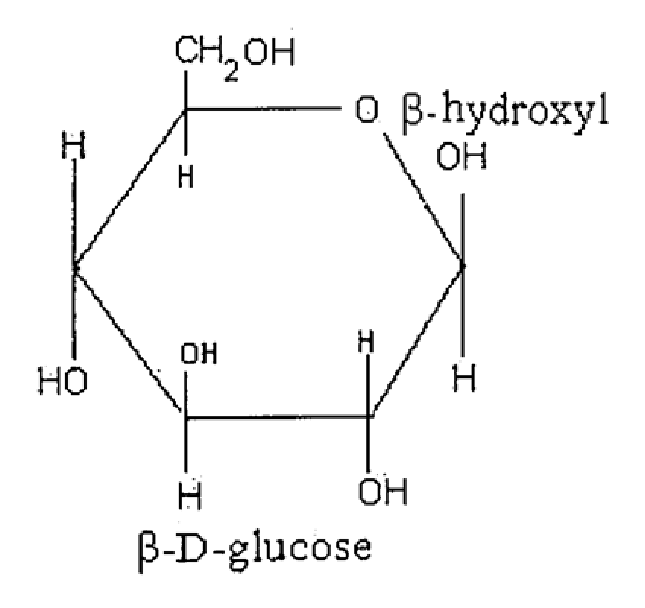
3-having sweet taste

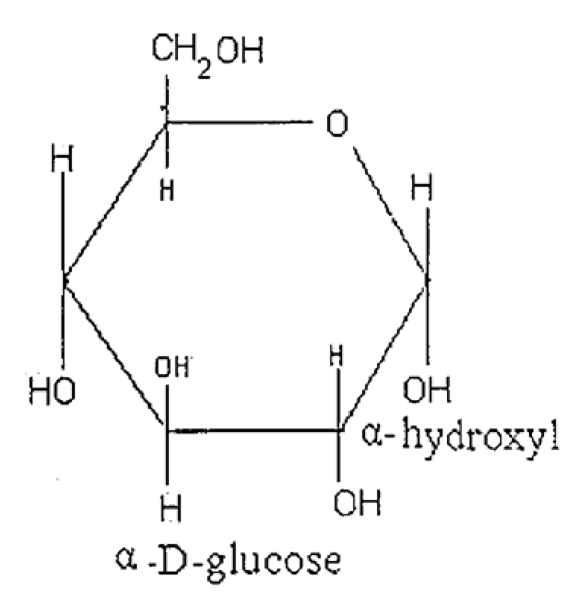
They are two types:-

Monosaccharaides	Disaccharides
- No. of carbon atoms 3 to 6 each atom is connected to oxygen and hydrogen atoms In a certain way. - The simplest type of sugars (G.R). - Formed of one molecule. Examples : - **Glucose** (grape sugar) - **Fructose** (fruit sugar) - **Ribose** (pentose sugar) - **Galactose**. (made in the glands that produce milk)	- Each molecule is made up of two molecules of monosaccharaides linked Together Examples : - **Maltose (malt sugar) :-** Formed of Two Glucose. Molecule - **Lactose (milk sugar) :-** Formed of glucose + galactose - **Sucrose (cane sugar) :-**Formed of glucose +fructose

Note:-

There are two types of glucose:-





2 Complex sugar

Properties of complex sugar

1-insoluble in water

2-have high molecular weight

3-don't have sweet taste

They are made up of many monosaccharaides linked together

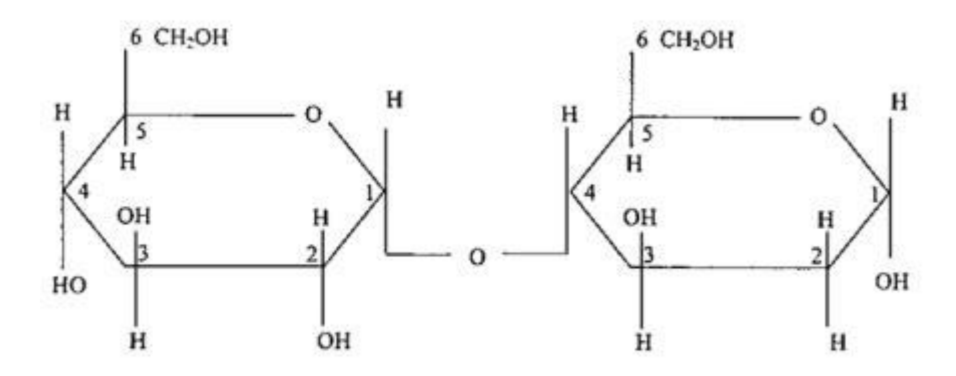
Examples

- Starch- (alpha glucose) **Cellulose (beta glucose)**

Glycogen

- Each of these molecules Consists of many glucose molecules linked together

Monosaccharaides are linked together by bonds called glycosidic bond which are covalent bond result in the formation of water molecule such as maltose molecule



MALTOSE (α - form)

That is mean when two glucose molecule combine together ***one*** molecule of water is resulted **(rehydration)** and also ***one*** glycosidic bond

α -D-glucose

α-hydroxyl

Glucose

Fructose

C Importance of carbohydrates

1-*obtaining energy:* it is considered from the basic and fast sources for energy

2-***storing energy***

During glucose oxidation inside the cells in mitochondria. the stored energy in the chemical bond that are present in glucose molecule is released to be stored in compounds called adenosine triphosphate (ATP) which are transferred into other places in the cell to perform all vital process

3-Building cells

Carbohydrates are considered a basic component of some parts of the cell such as: cellulose in the structure of plant cell wall

Carbohydrates enter in the structure of cell membranes and cell protoplasm

D Practical activity:-

1-Detection of simple sugars

- By using **Benedict' reagent** where:
Its colour turns from **blue** into **orange**.
- Benedict' reagent is used to detect
Mono- and di-saccharides.
- Benedict' reagent is used to detect
Simple sugars in urine and blood.
- Benedict' reagent is used to detect
Simple sugars in foods

2-Detection of starch:

- By using **iodine solution** where:
Its colour turns from **orange** into **dark Blue**.
- Iodine solution is used to detect
Starch in food samples.
- The degree of the colour of iodine
Solution depends on the amount of
Starch in the food samples.

Work sheet (1)

(1)**In the chloroplasts during the photosynthesis process, a large number of glucose Molecules is produced and stored through a process called………………**

(A)Hydrolysis. (b)Reduction.

(c) Polymerization. (d) Oxidation.

2-**The monosaccharaides contain………………………**

(a)3 :6hydrogen atoms: 3 Oxygen atoms. (b) 3:6Oxygenatoms.

(c) 6:12 carbon atoms. (D) 3:6hydrogen atoms.

3-**If you know that the number of hydrogen atoms in monosaccharide is (X), the number of Carbon atoms equals………………**

(a) x (b) x2

(c) 2X (d) 3X

4-**The number of oxygen atoms in ribose sugar is……………**

(a) 6 (b) 10

(c) 12 (d) 5

5- **On the hydrolysis of 3 sucrose molecules, are produced………………**

(A) 6 molecules of grape sugar

(b) 3 molecules of grape sugar and 3 molecules of fruit sugar

(c) 3 molecules of grape sugar and 3 molecules of cane sugar

(D) 3 molecules of grape sugar and 3 molecules of malt sugar

6- **On the hydrolysis of 20 molecules of maltose sugar, 10 molecules of lactose sugar and10 molecules of sucrose sugar. So, the total number of glucose, fructose and galactoseIs respectively**……………………

(A) 20/30 / 10 (b) 60 / 10/10

(c) 40 / 20 / 10 (d) 50/ 10 /30

٧-**After the digestion of bread, the excess of the human body need is stored in the form Of………………………**

(a) Glucose. (b) Starch.

(c) Cellulose. (d) Glycogen.

1-**Mention the name of the molecule that results from the combination of grape sugar molecule with**

(a) A molecule of fruit sugar
(b) A molecule of grape sugar

2-**what are the similarities and differences between: glycogen and galactose?**

3-**give an example for each of the following**

(a) A substance gives a positive result with benedict's reagent and negative result with iodine solution
(b) A substance gives a positive result with iodine solution and negative result with benedict's reagent

4-**compare between glucose sugar and sucrose sugar?**

5-each of the starch and glycogen is considered a polymer of galactose sugar

How far the statement is correct?

Compound (x)

(Y) is stored in an organ of body

(z) Enters in the structure of milk

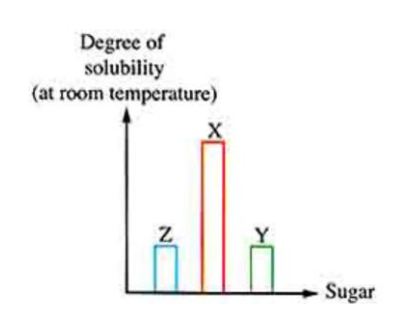
(L) Is detected by using iodine

6-**Mention the letter and the name of compound that represent each of the following:**

(a) Plant polymer
(b) Animal polymer
(c) Disaccharide
(d) Monosaccharaides

7-**mention the chemical formula of starch?**

8-in the opposite figure the compound (x) is…………………





LIPIDS

A Lipids are ....

- -they are biological macro-molecule (polymers) that are made up of many smaller molecules (monomers) called fatty acids and consist of a large group of heterogeneous compound such as fats , oils ,wax, phospholipids and lipid derivative
- -they consist of carbon(c), hydrogen (H), oxygen (O)
- -Lipids are insoluble in polar solvents such as water but they are soluble in non-polar solvents such as benzene and carbon tetrachloride.
- Lipids are formed by the combination of
  1-Three fatty acid
  2-One molecule of glycerol

(An alcohol contain three hydroxyl groups (OH)

H
H-C-O- Fatty acid ①
H-C-O- Fatty acid ②
H-C-O- Fatty acid ③
H

B Classification of lipid

Lipids are classified according to their chemical structure as follows:-

1. Simple lipids (oils-fats- waxes)
2. Complex lipids (phospholipid)
3. Lipid derivatives (cholesterol- some hormones)

1 Simple lipids (oils-fats- waxes)

They are formed by combination of fatty acid with alcohol

They are divided according to:-

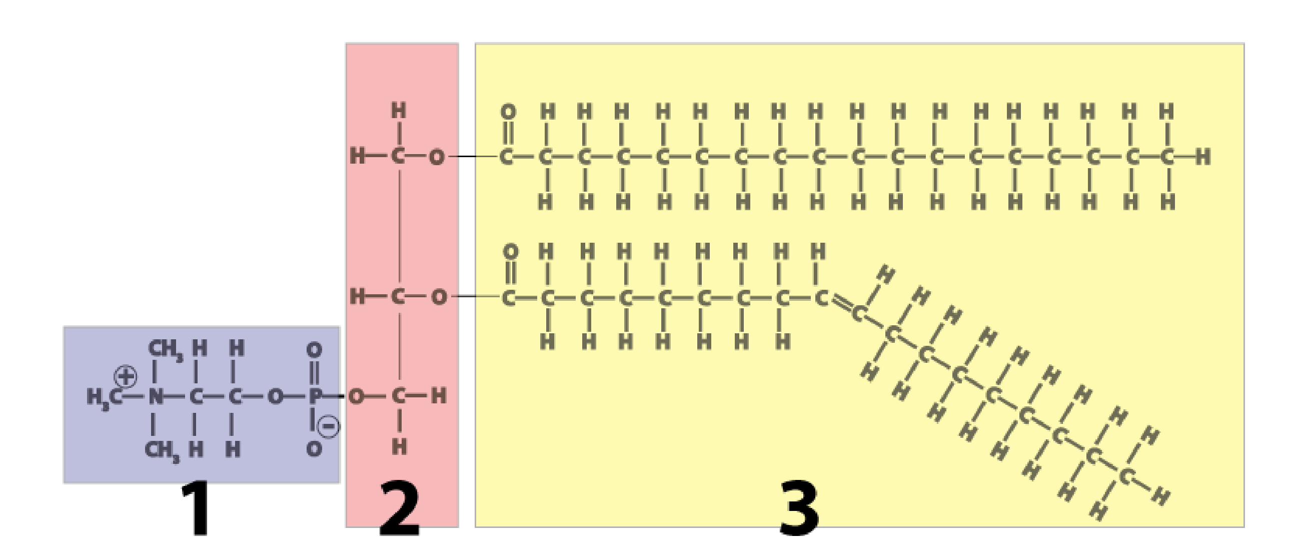
1-The saturation degree of fatty acid

2 - The type of alcohol

Lipid	Nature	Reaction of Formation	Example
	Liquid	Unsaturated fatty acid + glycerol	Oils that cover the feathers of water birds (G.R) to prevent water penetration to their bodies which Hinders their movement.
Fats	Solid	saturated fatty acid + Glycerol	The stored fats under the skin in some animals (polar beer) (G.R) to act as thermal insulator for keeping their body temperature in The severe cold (polar) region.
wax	Solid	Fatty acid + Alcohol (monohydric)	The waxes covering the desert plant leaves (G.R) to keep water inside their tissues and reduce its loss During transpiration

2 Complex lipids (phospholipid)

Structure	- Their structure involves carbon, hydrogen, oxygen, phosphorous and sulphur
Importance	Present in cell membranes of animal and plant cells.
Molecular structure	- It is similar to the structure of **fat** molecules with a phosphate group $(PO_4)^{-3}$ and Choline group replacing the 3rd fatty acid in fats. i.e. It consists of two fatty acids, glycerol molecule, $(PO_4)^{-3}$ and choline group



3 Lipid derivatives (cholesterol- some hormones)

They are derived from both of the simple and complex lipids by hydrolysis

Examples

1-Cholesterol

2-Some hormones (steroids)

C Importance of lipid

Obtaining Energy	Lipids (fats) are an important source for obtaining energy. - The body does not begin to get energy from the stored fats unless in case Of absence of carbohydrates. - The energy obtained from lipids is **more** than that obtained from the same Amount of carbohydrates.
Building cells	- They represent about **5%** of organic materials of the cell. - Lipids (Phospholipids) are involved in the structure of cell membranes
Work as thermal insulator	- Lipids (fats) form insulator layer under the skin of human and some animals (as polar bear) to keep their body temperature in the severe cold regions
Work as a protective cover	- Lipids (waxes) cover the surface of several plants, especially the desert Plants **for** reducing the water loss in transpiration process.
Works as Hormones	- Lipids (Steroids) work as hormones, such as steroids.

D Practical activity:-

- **Sudan-4 reagent** is used for detecting fats in different foods (G.R).
- Lipids change the colour of Sudan-4 stain into **red**.
- Sudan-4 is used to detect the fats in various foods, such as oils.
 Milk and peanut butter (G.R)

Because Sudan-4 is soluble in fats, where it turns into red colour in the presence of fats (lipids)

1-The classification of lipids depend on ……………………..

(a) The type of alcohol only (b) their physical properties

(C) The saturation degree of fatty acids only (d) (a) and (c) together

2-sunflower oil is present in a liquid state at room temperature because it contain ……………….

(A) Glycerol (B) a certain type of fatty acid

(c) Water molecules (d) carbon, hydrogen and oxygen

3-all the following biological molecule contain fatty acid and glycerol except ……………

(a) Oil (b) phospholipid

(C) Waxes (d) fats

4-the opposite graph shows compounds (x), (y), (z) and (L) that are in soluble In the polar solvent and soluble in Carbon tetrachloride study it then answer:

Number of fatty acids/molecule
3
2
1
Compound
(X) (Y) (Z) (L)

(1)The compound that cover surface of cactus …………………..

(a)X (b) Y

(C)Z (d) L

(2) The compound that contain phosphorus element …………

(a)X (b) Y

(C)Z (d) L

(3) The two compound (x) and (Y) differ from each other in the …………

(a) Solubility (b) number of fatty acids

(c) Type of fatty acids (d) type of alcohol

1-some times the spots on clothes aren't cleaned up by using water

Explain that.

2-Compare between substances covers the cactus leaves and substance that is stored under the human skin.

3-what are the similarities and differences between plant oil and plant wax?

4-lipids play an important role in maintaining the life of some animals and plants to adapt with the different condition .explain that

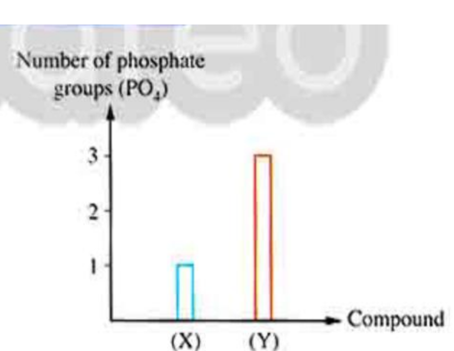
5-the opposite graph illustrate

The number of phosphate group in

Two compounds (x) and (y) in a cell

Determine the letter and the name

Of the compound that:-





(a) Represent the unit of energy store in the cell



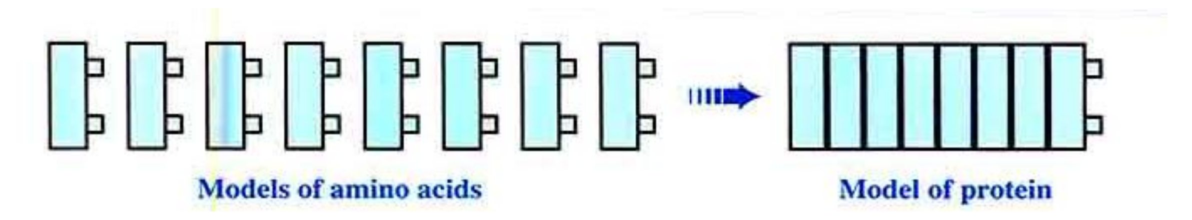
(b) Represent a lipid which enters in the structure of a part of the cell



Protein

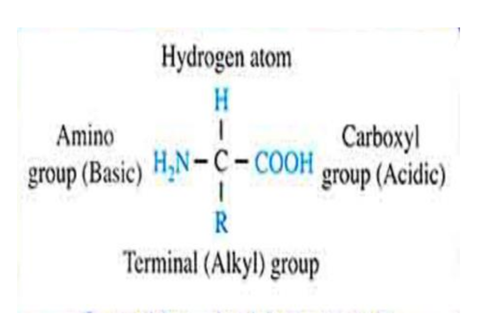
A Protein……

- They are biological macro-molecule (polymers) that are made up of many smaller molecules (monomers) called amino acid
- They consist of carbon (C), hydrogen (H) , oxygen (O)
- ***Molecular structure of proteins***
- Proteins have a high molecular weight and made up of building units which are the amino acids



Amino acid: - consist of

1- Hydrogen atom (H)
2- Two functional group which are
- A basic amino group (NH)
- A acidic carboxyl group (COOH)
3- A terminal (alkyl) group (R) which differs From an amino acid to another so it Determines the type of amino acid



Notes:

1- ***glycine*** is the only amino acid that doesn't contain a terminal group (alkyl) group (R) where is replaced by a hydrogen atom
2- there are 20 different amino acids that enter in composition of proteins such as glycine, alanine and valine

B — *Amino acids and building protein*

- Proteins are made up of repeated units of **amino acids**.
- Amino acids are linked together by **peptide bonds**.

• The peptide bond originates between:
The carboxyl group (COOH) of an amino acid and the amino group (NH) of another amino acid, through the removal of **water** molecule
(**OH^-** group from the carboxyl group and **H^+** ion
From the amino group)

Peptide Bond
A molecule of water is removed from two glycine amino acids to form a peptide bond.

❖ It is not condition for protein formation, the combination among similar amino acids Occurs So there are extensively wide and various possibilities To form proteins, depending on… **The types**, **the order** and **the number** Of amino acids in the polypeptide chain

C — Classification of protein

1 — Simple proteins

They are formed of amino acid only, such as **albumin** which is present in:-

1- Plant leaves and roots
2- Human blood plasma

2 Conjugated proteins

They are made up of amino acids associated with other element such as phosphorus, iodine, iron...

Examples:-

a- **Chromatin** (amino acid+ nucleic acid)
b- **Casein** (amino acid + phosphorous)
c- **Thyroxin** (amino acid+ iodine)
d- **Hemoglobin** (amino acid+ iron)

D *Importance of protein*

1- They are contributed in the biochemical processes that keep the life and its
Continuity, as they are involved in the structure of **enzymes**
And **several hormones** that stimulate and organize all vital processes in the body.
2- They are the structural building units for all the living organisms, where they are involved in the structure and function of all living cell, where:-
1- They are one of the basic components of the **cell membranes** and **chromosomes.**
2- They form the **muscles**, **ligaments**, **tendons**, **organs**, **glands**, **nails**, **hairs** and **skin.**
3- They are involved in the structure of many **body fluids, such as blood and lymph**.
4-They are necessary for **body growth**

E *Detection of protein*

1- **Biuret's reagent** is used in detecting the presence of proteins in various foods.
2- The colour of **Biuret's reagent** is changed from blue into violet.
3- Egg albumen is an example of foods containing proteins

1- Milk helps in building the body tissues, because it contains

(a)Mineral (b) fats.

(c)Lactose (d) casein

2- Milk is considered from the fast sources for obtaining energy in human, because it contains

(A) Fats. (B) Lactose.

(b) Mineral salt (d) casein

3-if the diet that you ate yesterday was consisting of 300 g of rice, 300 g of red meat, 50g of butter and 250 g of grapes. In the light of this, answer:

1- Which of the diet components contains the largest amount of energy in one-gram after its digestion?

(a)Meat. (b)Butter.

(c)Rice (d) Grapes.

{2) Which of the diet components is the excess of it stored in the body muscles, after it digestion?

(a) Rice. (b) Butter.

(c)Grapes (c).Meat

(3) Which of the diet components is transferred to mitochondria directly, after its digestion?

(a) Meat (b). Rice.

(b) Butter .(d)Grapes.

4) Which of the diet components is used by the body cells first to produce energy, after its digestion?

(a)Grape (b) Rice

(c)Meat (d) Butter.

(5) Which of the diet components is used by the body to compensate the damaged tissues?

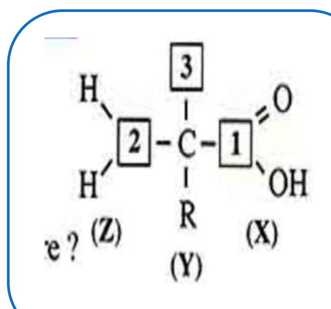
(a)Grapes (b) Meat

(c)Butter (d) Rice.

4-Biuret's indicator gives a positive result with the…………………

(A) Grape juice. (b) Peanut powder.

(c) Wheat powder. (d) Bean seeds powder.



(1)From the opposite figure:

(a) What does this figure represent?

(b) What do the numbers from no? (1): (3) represent?

(c) Which of the letters represent(s) the functional groups of this figure?

(d) Mention the letter of the group by which the name of figure changes completely when changing it

(e) What is the name of the compound that is resulted from the combination of two units of this figure? And how does this combination occur?

(f) What is the type of the bond that is formed on the combination of several units of this figure? And what is the name of the resulting compound?

(2) What happens in case of: replacing the alkyl (R) group in an amino acid with another alkyl group

(3)What are the similarities and differences between: amino acids and fatty acids?

(4)Give reason for: The alkyl group (R) determines the type of amino acid

(5)There is a limited number of protein compounds, as a result of the presence of 20 types of amino acids". How far this statement is correct? With explanation.

(6) Explain the formation of a polypeptide chain is considered a dehydration reaction.

(7)What happens in case of: changing the type of an amino acid in a certain protein? Explain your answer.

(8) A meal consists of bean with oil and bread

(a) Mention the biological macro-molecules in this meal.

(b) Mention the final form that is resulted from the digestion of the components of this meal

(9)Mention what the following statements indicate

(a) A polymer that iodine element enters in its basic structure.

(b) A polymer that iron element enters in its basic structure.

(c) A polymer that phosphorus element enters in its basic structure.

(10)Some plant proteins are similar to the proteins that are present in human

How far this statement is correct? With explanation.

(11) What happens if: the amino acids that form proteins are similar in the order, number and type?

(12) Some individuals suffer from anaemia disease, if you were asked to advise them about the nutrition style. What do you advise them in the light of your study?

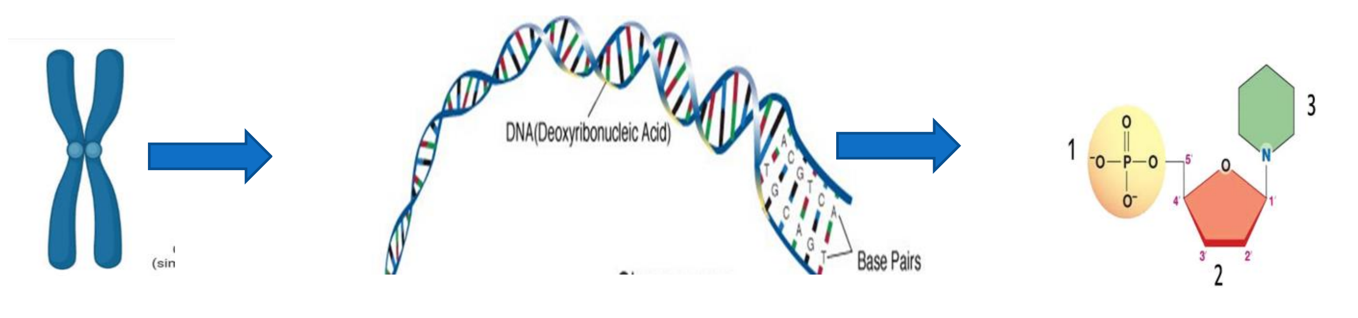
(13)The shortage of iodine element in the body causes a disturbance in the thyroid gland". How far this statement is correct with explanation



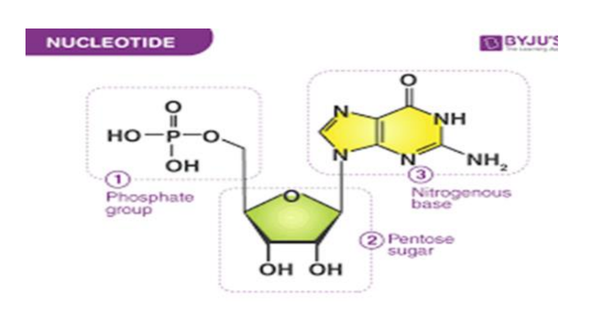
Nucleic acid

A Nucleic acid

- They are biological macro0molecule (polymers) that are made up of many smaller molecule (monomers) called nucleotide
- They consist of carbon (c),hydrogen (H),oxygen(O),nitrogen(N) and phosphorous (PH) atoms
- Nucleotide bind together by covalent bond to form polynucleotide
- (nucleic acid)



Structure of nucleotide:-



Each nucleotide consists of 3 units:

1 A pentose sugar

(Consists of 5 carbon atoms may Deoxyribose sugar (in DNA)
or - ribose (in RNA)

٢ A phosphate group:

(Attached to the carbon atom no. 5 of the pentose sugar by a covalent bond)

٣ A nitrogenous base:

Attached to the carbon atom no. 1 of the pentose sugar by a covalent bond.

There are 5 types of nitrogenous bases:

Adenine (A), **Guanine** (G), **Cytosine** (C), and **Thymine** (T) and **Uracil** (U).

B Classification of nucleotide:-

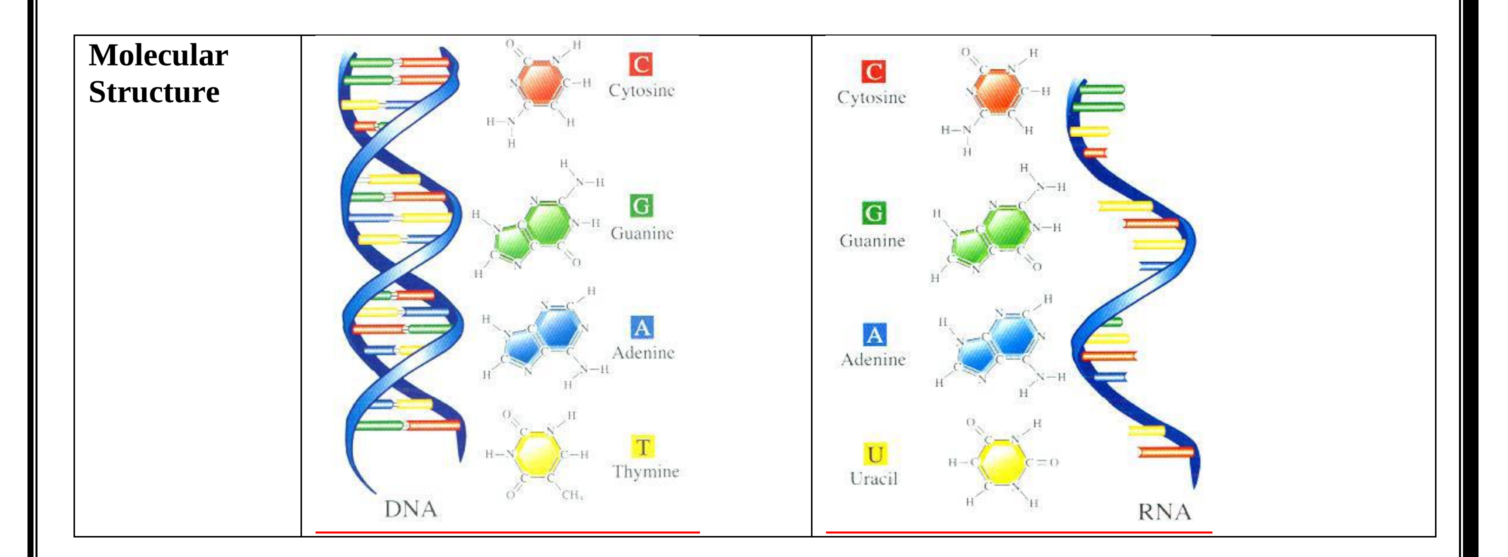
There are two types of nucleic acid which are:

1 Deoxyribonucleic acid (DNA)



Ribonucleic acid (RNA)

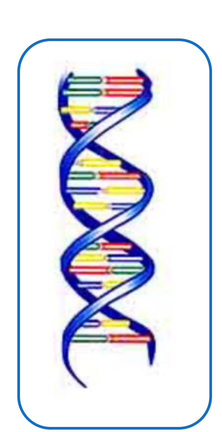
	Deoxyribonucleic acid (DNA)	**Ribonucleic acid (RNA)**
Type of pentose sugar	Deoxyribose sugar (lack an oxygen atom than ribose sugar)	Ribose sugar
Nitrogenous Bases	Adenine (A), Guanine (G), Cytosine (C), And **Thymine (T).**	Adenine (A), Guanine (G), Cytosine (C), and **Uracil (U).**
No. of Strands	2 strands of nucleotides.	Single strand of nucleotides.
Location	Inside the nucleus of the cell where it is involved in the structure of the chromosomes	It is transcribed (formed) from DNA inside the nucleus and Then transferred into the Cytoplasm.
Importance	It carries the genetic information that passes from a generation to another, when the cells divide and these information are responsible for: - Appearing the distinctive characters of The living organism. - Organizing all vital activities of cells.	- It is used in building the Proteins which the Cell needs. - These proteins are responsible for: • Appearing the genetic traits. • Organizing the vital Activities.



1-The opposite figure illustrates a nucleic acid that is found

In the living cell. From this figure. It is illustrated that

This structure consists of



a) Three similar building units in the chemical structure.

(b) Three different building units in the chemical structure.

(c) Four similar building units in the chemical structure.

(d) Four different building units in the chemical structure.

2- All the following contain nitrogen element in its structure, except the...

(a) Building unit of deoxyribonucleic acid.

(b) Building unit of ribonucleic acid.

(c) Building unit of albumin.

(d) Building unit of starch.

3- Which of the following statements is correct?

(a)In the cell, DNA consists of protein.

(b) Protein consists of DNA and is stored in the cell

(c) DNA controls the formation of protein in the cell.

(d)The cell consists of DNA and protein

4-Scientists thought that mitochondria resembles the independent cell.

Because it…………………

(A) Contains DNA

(b)Contains RNA

(c)Contains DNA and RNA

(d) Doesn't contain DNA or RNA

5- Haemoglobin differs from thyroxin in all of the following, except the

(a) Type of chemical bonds.

(b) Number of amino acids,

(c) Type of amino acids

(d) Order of amino acids

6-Which of the following doesn't contain phosphorus element in its structure?

a) ATP (b) Thyroxin

(c)Casein. (d)Nucleotide,

1-Calculate the number of water molecules that had been removed from 67 amino acids to form a polypeptide chain.

2-What happens if the cell loses its ability to synthesize the protein?

3- What is the similarity between: the amino acid "valine" and the nucleic acid "RNA?

4-What is the normal sequence to form the protein in the cell?

5-The opposite figure illustrates a group

Of animal cells. In the light of your

Study, determine which biological

Macro-molecule enters in the structure

Of (X) and (Y).Infected

Chemical reactions in organisms' bodies

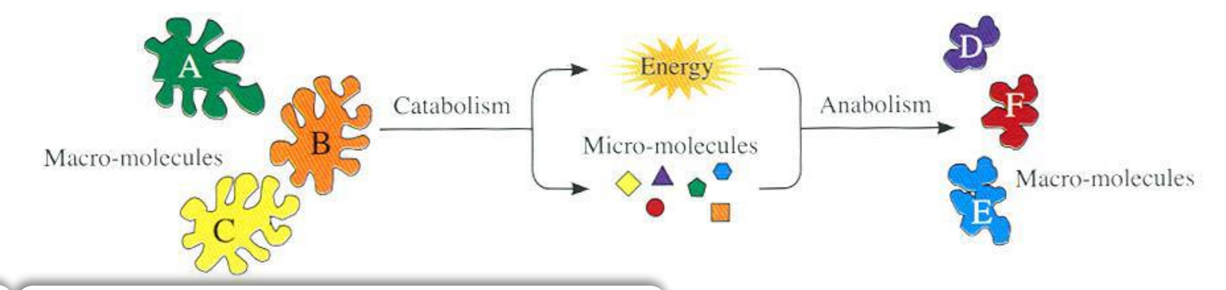
A Metabolism

- It is a group of continuous biochemical reactions taking place inside living cells.

- Metabolic reactions are divided into two processes:

1. Catabolism
2. Anabolism.

Catabolism	Anabolism
It is the process of breaking down chemical bonds between atoms of molecules (macromolecules) to extract the chemical Energy stored in them. **Example**: - Releasing the energy from glucose oxidation During cellular respiration.	- It is the process of using simple Molecules for building more complex substances. - It consumes energy **Example:** - Synthesis of proteins from amino acids. - Photosynthesis in green plants.



B Importance of metabolism:-

1- It is necessary for growth of the body (anabolism).
2- It is necessary for repairing damaged tissues (anabolism).
3-It is necessary for obtaining energy required for
The vital activity (catabolism).

- These reactions continue in all living organisms, stopping of these reaction lead to death

ENZYMES

They are protein molecules acting as biological catalysts to increase the speed of chemical reactions inside the cell

C Why does the cell need energy?

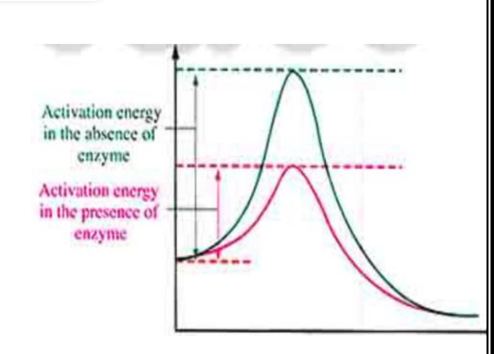
In order for the biochemical reactions to occur in the cell they need a high activation energy to be started where the activation energy is the minimum energy needed to start the chemical reaction and to reduce the cell consumption of more energy there should be a catalyst (enzyme) to insure the occurrence of the chemical reaction

- ***Activation energy:-***

It is the minimum energy needed in order for a chemical reaction to occur.

D Effect of enzymes on the activation energy

- The enzymes reduce the activation energy Needed for starting the reaction



E Structure of the enzyme

The enzyme is made up of large number of amino acids that form one polypeptide chain or more which forms the specific spatial structure of enzyme

F Properties of enzymes

1-Enzymes are similar to the other chemical reaction catalyst

Both of them speed up without being affected

2-Enzymes are highly specific than chemical reaction

3-enzymes reduce the activation energy

G Factors that affect the speed of enzyme

1. Temperature
2. PH (hydrogen ion concentration).
3. Enzyme concentration
4. Substrate concentration.
5. Presence of inhibitors

1 ***Effect of Temperature On the enzyme***

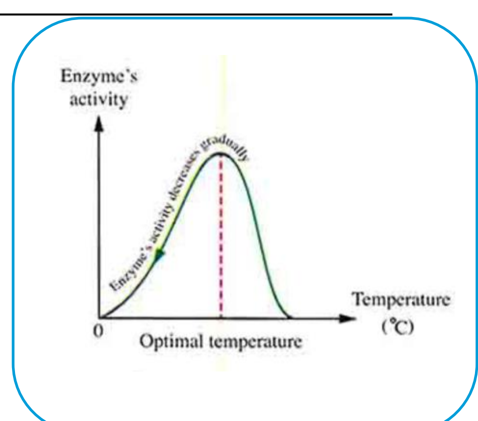
- Enzymes are sensitive to thermal changes because they are made up of protein substances.

- Their activity is determined in a narrow range of temperature
Because each Enzyme has an **optimal temperature** at which the enzyme activity is more, it ranges between 37° and 40°C.

- the temperature <u>decrease below</u> the

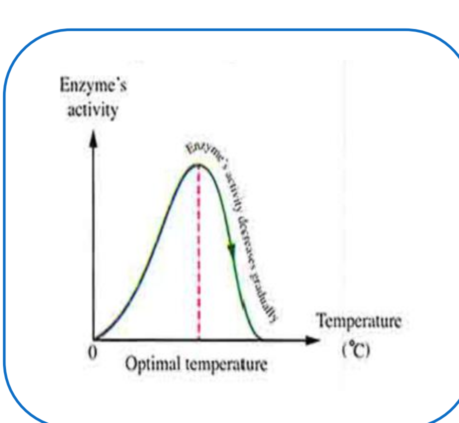
Optimal temperature until it reaches

A minimum temperature at which



The enzymes Activity is the lowest and it stops completely at 0 but Enzyme restore its activity get reactivated Once more on rising the temperature

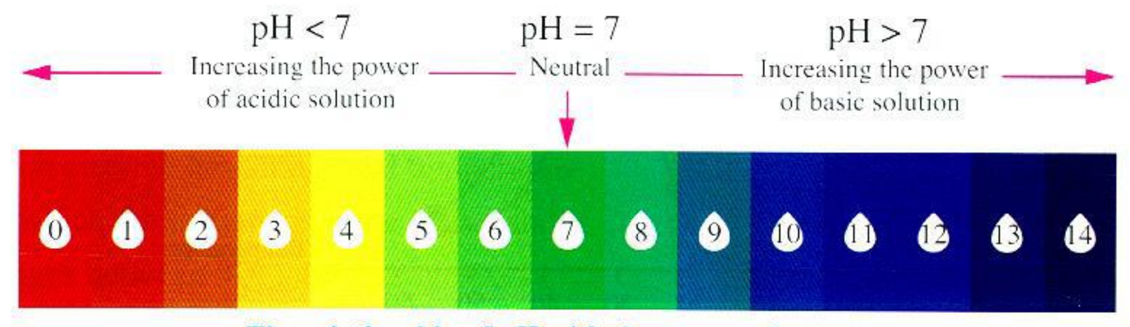
- The temperature rises above its optimal Temperature Until it reach a certain Temperature at which the enzymes Activity stops completely due to the change Of its natural Composition and the enzyme Will not restore its activity



2 Effect of PH on the enzyme action

Power of hydrogen (Potential of hydrogen) pH:
It is a measurement that determines the concentration of hydrogen ion (H^+) in the solution, whether the solution is acidic, basic or neutral

Where:
- If pH < 7 the solution is acidic. - If pH > 7 the solution is basic.
- If pH = 7 the solution is neutral (This is the pH of pure water at **25ºC)**
- The values of pH are ranged between (0: 14) depending on the positive hydrogen ion (H^+). Concentration



The relationship of pH with the nature of solution

Relationship between pH and enzyme activity:

• The enzyme activity is affected by changing pH values (GR.) because they are protein substances that contain:
1- **Acidic** carboxyl groups (COOH).
2-Basic amino groups (NH_2).

• Each enzyme has its optimal pH value at which it works with a maximum efficiency. And if the pH is lower or higher than the optimal pH of the enzyme, enzyme s activity decrease until it stop

Example:-

Pepsin enzyme: Works in the stomach at an **acidic** medium
PH (1.5: 2.5)

Trypsin enzymes: Works in the small intestine at an **alkaline** medium
PH (7.5: 8.0)

• **Most enzymes work at pH value equals 7.4** (neutral medium)
The amino acid molecules that form the enzyme contain acidic carboxyl Group and basic amino Group.

• **Amylase enzyme:**
- Is an enzyme that catalyses the hydrolysis of starch into maltose.
- It acts in a solution of pH = 7.5
- If the pH value is more or less than 7.5 amylase enzyme doesn’t affect starch.

• **Buffer solution:**
It is the solution that keeps the value of pH of a solution constant.

1-from the forms of the anabolic process inside the living organism is the……………..

(A) Digestion (b) polymerization.

(c) Decay. (D) Oxidation.

2 Which of the following statements expresses a characteristic of the catabolic Process?

(a)It aims to store energy inside the cell, till using it.

(b) it occurs in the plant cells, and it doesn't t occur in the human cells.

(c)By which the energy that is required for performing the vital functions of the cell is obtained.

(D) It occurs in the human cells, and it doesn't occur in the plant cells.

3-The following figure expresses two processes that occur in a plant cell, what do these Processes represent?

(a) The process (2) is catabolism, and the process (l) is anabolism.

(b)The process (1) is catabolism, and the process (2) is anabolism.

(C)The both processes (I) and (2) are catabolism.

(d)The both processes (1) and (2) are anabolism.

4 Which of the following shows the Rate of the catabolism and anabolism for cells of a 5-month-old child?

(a) A (b) B

(c)D (d) C

5-All the following statements are correct, except that

(a) All the proteins are enzymes.

(b) All the enzymes contain peptide bonds.

(c) All the enzymes are proteins

(D) All he proteins contain nitrogen element

6-All the following statements are correct, excepts that

(A) Some hormones consist of lipids

(b) Some hormones consist of proteins,

(c) The enzymes consist of lipids.

(d) The enzymes consist of proteins.

7- If you know that the amylase enzyme helps in starch digestion in mouth, therefore the activation energy needed to hydrolyze starch on adding the enzyme

(A) Increases.

(b) Is not affected.

(c)) vanishes

(d) Decreases

8-On trying to carry out the enzymatic reaction in lab without using the enzyme required for the reaction. Therefore the reaction will

(a) Not occur, due to the absence of enzyme

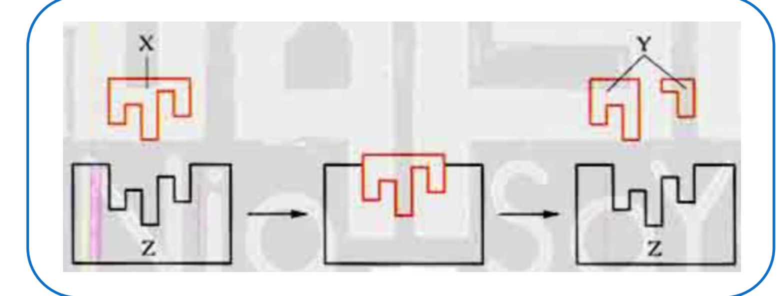
(b) Occur and give different results.

(c) Occur and takes much more Lime.

(d) Occur with a faster rate.

9- The following figure represents a model for the action of an enzyme inside the

Human body, which of the following statements represents the letters (X), (Y) and (Z) Respectively



(a)Enzyme Products Substrate

(b)Enzyme Substrate / Products

(c)Substrate Enzyme Products

(d)Substrate / Products/ Enzyme

1-The metabolic processes are contrasting

How far this statement is correct? With explanation.

2-The cell can accomplish the chemical reactions with a greater speed and less consumption of activation energy, explain this.

3-Pepsin enzyme that works in the small intestine needs a buffer Solution whose pH value Equals 1.5 in order to work with a maximum efficiency

How far this statement is correct? With explanation

4- What happens in case of: increasing the acidity of stomach above the optimal value for the action of its enzymes?

5-"In the reactions of the trypsin enzyme, a neutral buffer solution is used to prepare the Medium for the enzyme action". How far this statement is correct? With explanation.

6-At the normal conditions in lab, the enzyme is used directly with the substrate to perform its action". How far this statement is correct? With explanation

Cell theory

A The living organism's types

They are divided into **two types** according to the structure of their bodies:

Unicellular organisms	**Multicellular Organisms**
Their body consists of one cell only, which perform all the vital activities Needed for the continuity of life. e.g. Amoeba, bacteria and Paramecium	Their body consists of many cells, which differentiate and specialize in Their functions. E.g. Man, whale and trees.

The cell:-

- It is the smallest functional and building unit in all living organisms

B Properties of the cells:-

1- **They are varied in shape, structure and size, where**:

- The tiniest cell in size is the bacterial cell.
- The biggest cell in size is the cell of the unfertilized egg of the Ostrich

2- **There is a relationship between the shape of cells and functions they perform**

Nerve cells (neurons):

Are the longest cells (may reach 1 meter or little more) (GR.) to be able to transfer the messages from the spinal cord that present inside the body Vertebral column to the farthest parts of such as toes.

Muscular cells:

Are cylindrical, long and gather with each other to form the muscle fiber which can contract and relax, helping the animal to move freely.

C Discovery of the cell

Robert Hook	The favour in cell discovery is referred to Robert Hook because:- - He invented a simple microscope in 1665 and used it to examine a piece of cork tissue, it was composed of small boxes arranged in rows, he named each box by the word **the cell**.(it is derived from the Latin word cellula the cell or the small room
Van Leeuwenhoek	He was the first to observe microscopic organisms and living cells (GR.), as: - He made a simple microscope (1674) by using lenses with the ability to - magnify objects up to 200 times of their original size. - He examined different substances (water ponds, blood and others)
Shleiden	He deduced that plants are composed of cells (In 1838). He stated this depending on his own researches and those of other previous Scientists.
Schwann	He deduced that all living organisms are composed of cells.(In 1893)
Virchow	In 1855, he stated that: - The cell is the functional and building unit of all living organism. - The new cells are produced only by pre-existing other living cells.

- the efforts of the previous scientist lead us to know the principles of the cell theory :-

1-All the living organisms are made up of cells which may single or grouped in clusters.
2- Cells are the basic functional units of all living organisms.
3- All cells come only from other pre-existing living cells

D Development of microscopes

- It is difficult to visualize the cell or its components, because it is has a very minute size.
- The cell discovery was related to the invention of microscopes because it has a very minute size and it was difficult to see it or its components.
- The vision of the cell components was related to the invention of the electron microscope. Because it has a high magnifying power

	Light microscope	**electron microscope**
Idea of work	It depends on the sunlight or an artificial light	It depends on using a beam of high speed Electrons instead of light.
Types of used lenses	Glass lenses (ocular and objective lenses)	Electromagnetic lenses (control the electron beam)
Functions	- Magnifying many micro-organisms And non-living things. - Examining large-sized objects after cutting them into very thin slices (GR.) to allow the light to transmit through Them .	Clarifying the cellular components that had Not been known before. - Knowing more accurate details about the Cellular structures that had been known before.
Properties of its image	Less magnified and Less contrasted	- Highly magnified and highly contrasted than That of the light microscope (GR.) due to the shortness of wavelength of the electronic ray Comparatively to that of the light ray. They are received on a fluorescent screen or - on a highly sensitive Photographinging board.
Magnifying power	- Up to 1500 times of their real size it can't be more the image will be not clear	It magnifies objects one million time or more very high).

E Calculation of the magnifying power

(Magnifying power of the ocular lens) X **(Magnifying power of the objective lens)**

How to obtain the clearest image of specimens:

1- Changing the level of light.
2- Using dyes **(**Dyes are used to stain or colour certain parts of the specimen to clear)

F Types of electron microscopes:-

1-Scanning electron microscope: It is used to study the cell surface.

2-Transmission electron microscope: It is used to study the cell internal structure



1-scanning electron Microscope



2- Transmissionelectron Microscope

1-The scientist who is the founder of the cell theory is

(a)Theodor Sehwann. (b) Robert Hooke.

(c)Virchow. (d) Schleiden.

2- Light microscope with magnifying power (400x), if the magnifying power of its ocular Lens is (10x), therefore the magnifying power of its objective lens is

(a) 30x (b) 40x

(c) 60x (d) 50x

3- The first scientist who proved that the cell is the functional unit is -

(a)Robert Hooke (B) Theodor Schwann.

(C))Virchow (d) Schleiden.

4-Schleiden was the first scientist who observed that the cell is the building unit, because

(a) He was the first who observed the world of the microscopic organisms

(b) He was the first who examined an animal tissue and he found it consisting of cells.

(c) He was the first who examined a plant tissue and he found it consisting of cells.

(d) He was the first who made a compound light microscope.

5-The scientist who Schwann depends on one of his principles in showing his conclusion, is……………………….

(a) Robert Hooke. (b) Van Leeuwenhoek

(c)Schleiden (d) Virchow.

6 -The microscope that is used in studying the details of the internal surface of

Mitochondria in a muscular cell is…………………..

(A) Simple light microscope.

(b) Compound light microscope.

(C) Scanning electron microscope

(D) Transmission electron microscope.

7- Which one of the following supports the cell theory?

(a)All the living cells need to glucose.

(b)The living cell contains a nucleus to regulate its vital functions.

(c) All the living cells contain cell wall.

(d)The cell is a basic unit for the life.

1-What is the relationship between: the wavelength of the used beam and the contrast of the image that is formed by the microscope?

2-Explain: the electron microscope is better than the light microscope in the examination.

3- What happens in case of: the staining of Amoeba with red eosin during its division?

4- The cell theory was appeared, as a result of the efforts of three scientists, mention the role of each scientist?

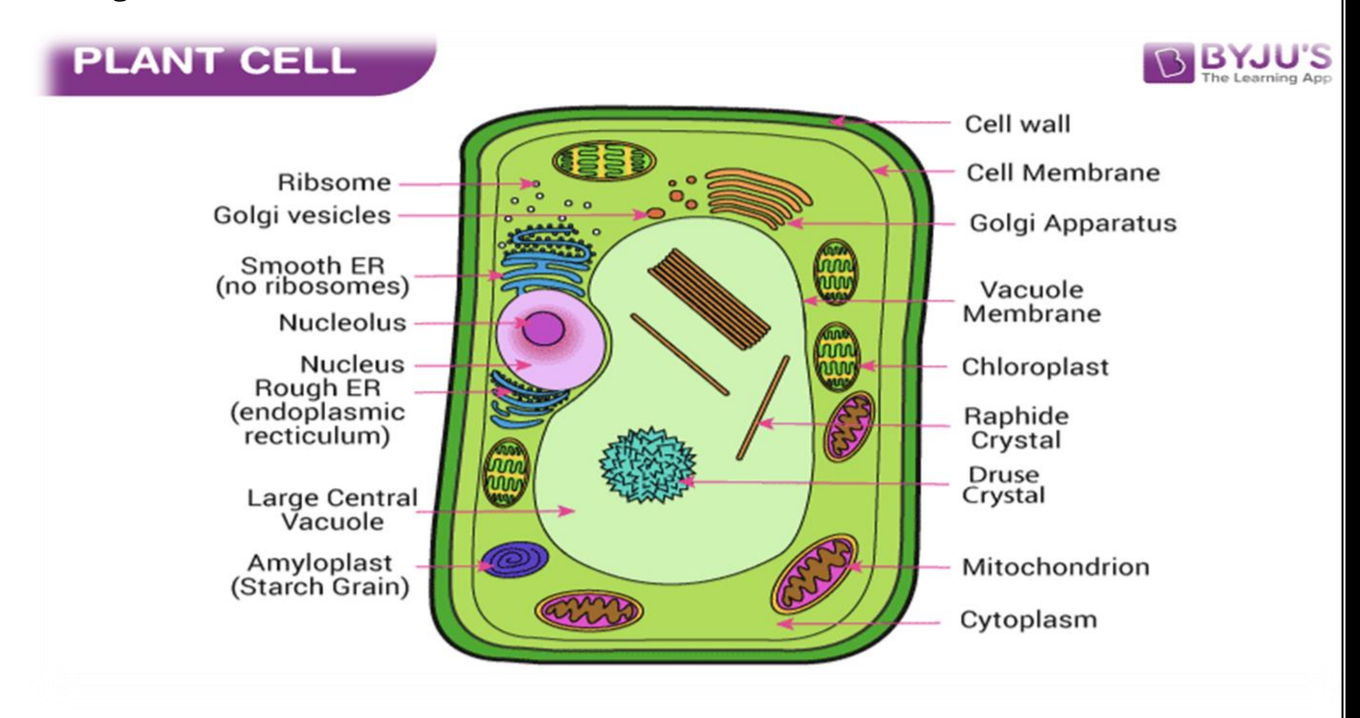
5- Give reason for: it is not preferred to add dyes to Amoeba on its examination.

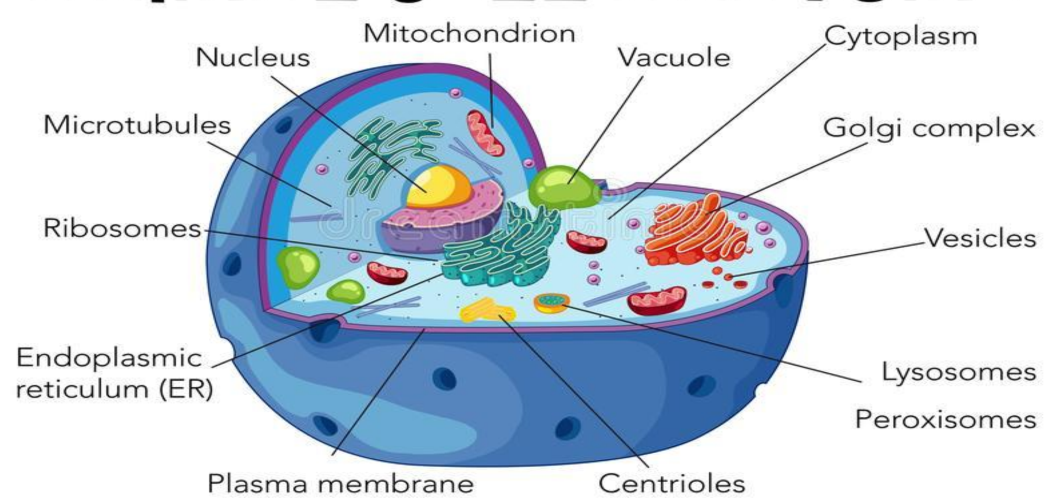
6-What happens in case of: the magnifying of the specimen of an animal tissue by using? The light microscope more than 1500 times of its real size?

7-f you know that the magnifying Power of the objective lens is (40x) and that of the ocular Lens is (10x). What is the magnifying power of this light microscope?

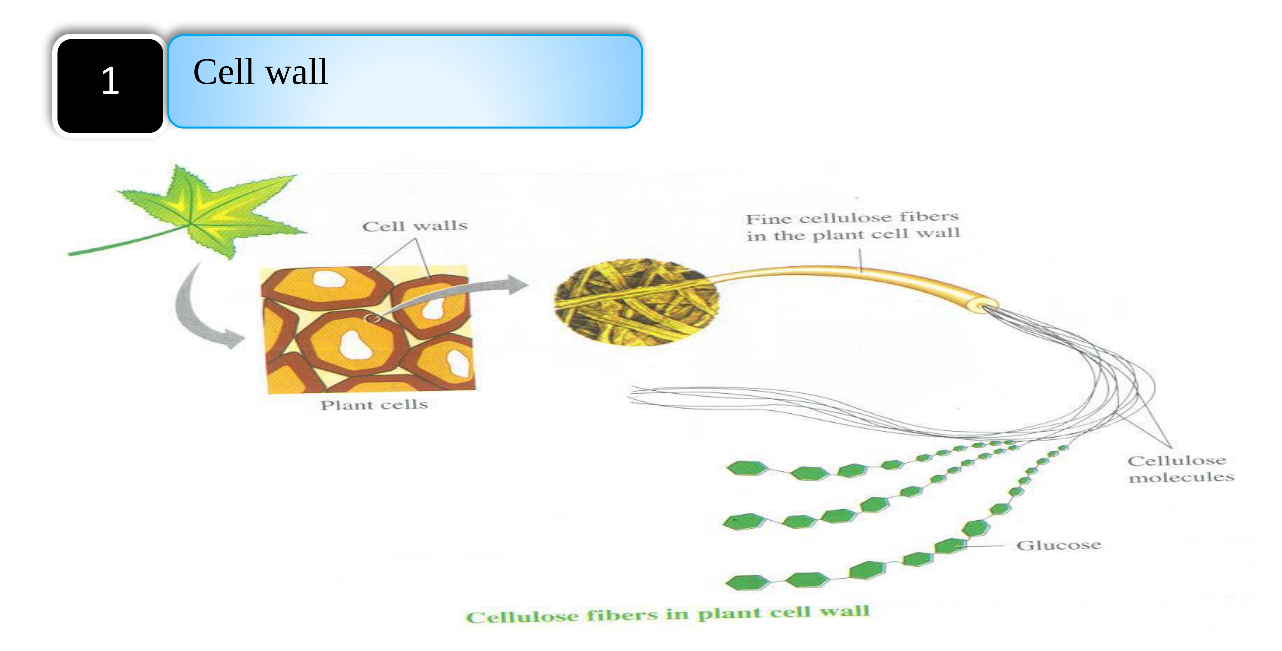
Cell structure

- Cell can perform different metabolic activities.
- It can do these functions by its main parts.
- It is formed of a **protoplasmic mass** which is surrounded by **cell membrane** and **cell wall** or by a **cell membrane only.**
- **The protoplasm** is differentiated into **nucleus** and **cytoplasm.**
- The cytoplasm contains a group of cellular structures called cell **organelles.** Which they are divided into **membranous** and **non-membranous** organelles





1 Cell wall



- ***Location:-***

- It surrounds: the plant cell, algae, fungi and some types of bacteria.
- It is not present in the animal cell.

- ***Structure:-***

It is mainly composed of cellulose fibers.

- ***Functions:-***

It supports and protects the plant cell and gives its characteristic shape.
It allows the passage of water and dissolved substances through it easily
Because it is pitted

---

2 Cell membrane

Outside of cell
Carbohydrate chains
Proteins
Lipid Bilayer
Transport Protein
Phospholipids
Inside of cell (cytoplasm)

- ***Location:-***

It surrounds: the cytoplasm of plant and animal cell.

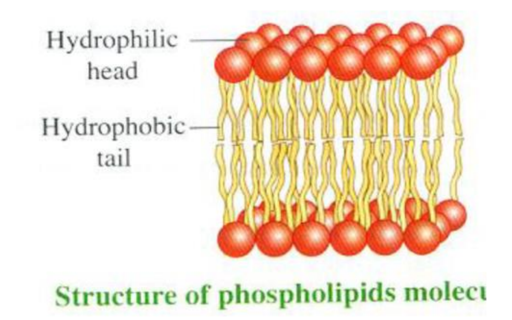
- ***Structure:-***

It is a thin membrane consists of:

1- Two layers of fluid phospholipid mole

Each of them consists of:

- **Hydrophilic heads**: soluble in water, Facing the water medium inside and Outside the cell.
- **Hydrophobic tails**, insoluble in water, Present inside the membrane.



Structure of phospholipids molecu

2- **Molecules of protein embedded between the molecules of these two Phospholipids layers, where:**

- **Some of them work as cell identification sites** for different substances Such as nutrients, hormones and others.
- **Others, work as gates** for the passage of substances to and from the cell.

3- **Cholesterol molecules**,

Linked with phospholipid molecules to maintain the membrane cohesive and intact

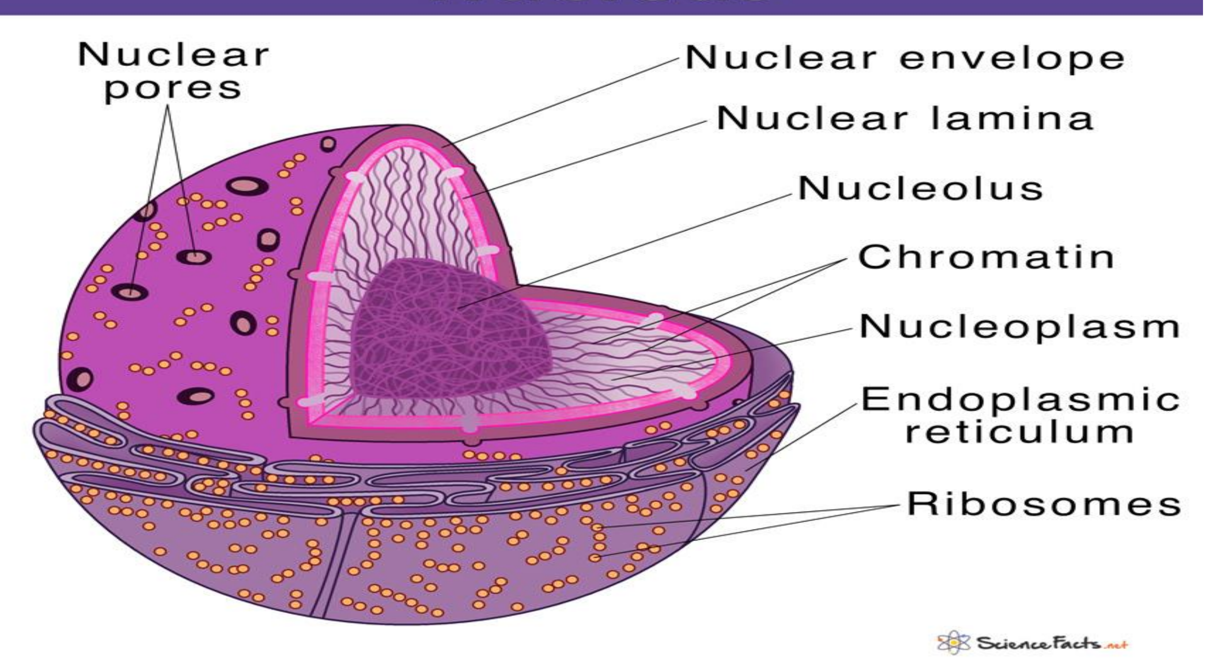
----

- ***Functions:--***

1- **It covers the cell and separates its content** from the surrounding Medium, so that it prevents the spreading out of protoplasm outside the cell.

2- **It performs a basic role in organizing the passage of substances** to and From the cell.

3 Nucleus



- It is the most obvious organelle in the cell that can be seen under the microscope.
- It has a spherical or oval shape.

- **Location:-**

- It is often located in the centre of the cell.
- It is present in the plant and animal cell.

- **Structure and function**

It is composed of:
1- Nuclear envelope:
Double membrane, surrounds the nucleus.
- Separates the nucleus from the cytoplasm.
- It has several tiny pores, through which substances pass between the Nucleus and cytoplasm.

2-Nucleoplasm:
Transparent gelatinous fluid inside the nucleus.
- It contains the nucleolus and chromosomes.

3 -Nucleolus: It is responsible for the synthesis of ribosomes which play an Important role in protein synthesis.

Note:-

- **Many cells**, especially the cells that secrete enzymes and hormones, **have More than one nucleolus** as it play an important role in protein synthesis Such as enzymes and hormones.

4 -Chromatin:
it is minute tangled filaments that are coiled around
Each other. During cell division, it changes into rod-like structures called
Chromosomes

4 Chromosomes:-

- **Appearance:**

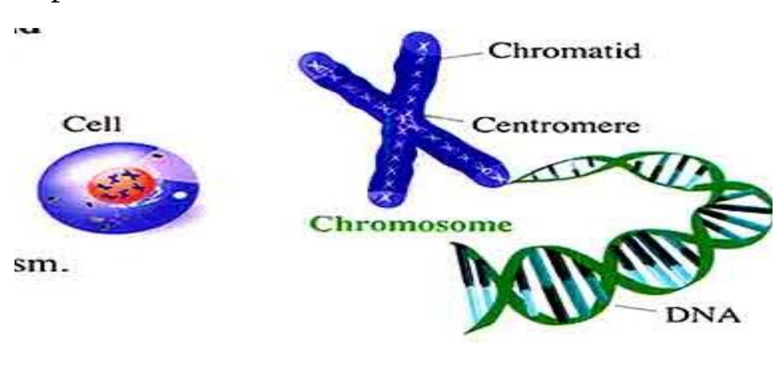
They appear more obvious during the metaphase of cell division.
Structure:
Each one consists of two filaments called (Two **chromatids**)
The two chromatids are joined together by
A central part called **centromere**.

- **Structure of the chromatid:**

It consists of **DNA** that is coiled around protein molecules called **histones**.

- **Functions of DNA:-**

It carries the genetic information (genes) that:
1- Control the shape and structure of the cell and organize its vital activities.
2- Transfer the genetic traits (characters) from a generation to another through Reproduction process.



1-The opposite figure illustrates a part of Spirogyra alga on its examining under the microscope, study it, and then answer:

(1) The structure (X) that separates between two neighbouring cells in the alga consists of…………………………

(a) Carbohydrates (b) proteins

(c) Lipids (d) phospholipids.

(2) The building unit that enters in the structure (X) is…………………

(A) Glucose. (b) Amino acid.

(c) Glycerol. (D) Fatty acid.

(3) The structure (X) consists chemically of…………………………

(a) Biological micro-molecules.

(b) Biological macro-molecules.

(c) Biological macro and micro-molecules.

(d) Inorganic molecules.

(4) The structure(Y) refers to………………………………

(A) Nucleolus. (b) Green plastids

(c) Nucleus. (d) Sap vacuole.

2 Which of the following substances determines the shape of a com plant cell?

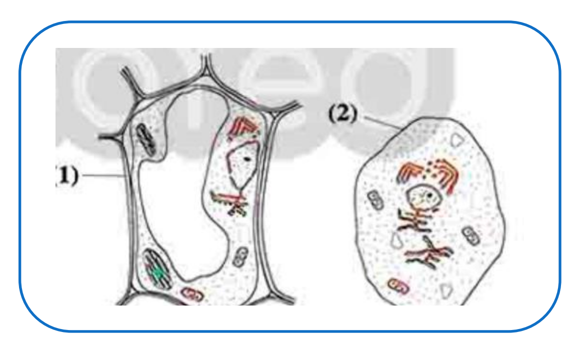
(a)Proteins and cellulose.

(b) Lipids and proteins.

(C) Lipids only

(d) Cellulose only.

3- From the two opposite figures, the parts no.(1) and (2) Have the same characteristic of the following ones which is……………………..



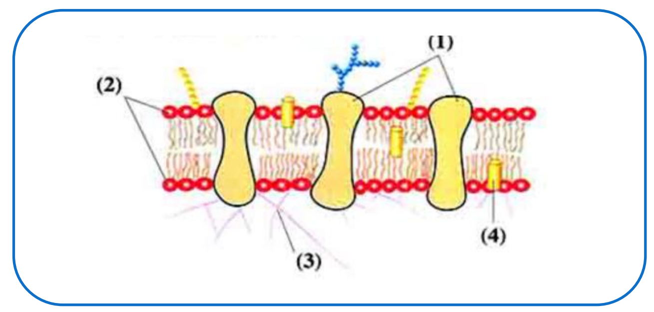
(a) The presence of pores.

(B) The separation between the cell contents and its Surrounding medium

(C) The control of the passage of substances

(d) The liquid state for each one of them.

4-The opposite figure represents a part of the Living cell. Study it then answer



(1)Which part in this figure attaches with the cell organelles

(a)(1). (b) 2)

(c) 3 (d)(4)

(2) Which of the following parts has a role in choosing certain substances to enter the cell?

(a) 2 (b) 3

(c) 4 (d) 1

(3) The previous figure consists of ……………………..compounds

(a) Homogenous (b) Heterogeneous

(c) Similar (d) Homogenous and heterogeneous

5- The hormones are secreted from the endocrine glands and are released directly into the blood, but they affect some cells (effector cells) that recognize the hormones by……………………………

(a) Plasma membrane phospholipids.

(b) Plasma membrane proteins.

(c) Cell secretions.

(D) Plasma membrane cholesterol

6 -The complex lipid(s) that enter(s) in the structure of the plasma membrane is (are)………………

(A) Phospholipid. (b) Cholesterol.

(c) Waxes (d) steroids.

7- Which of the following statements is correct?

(a)DNA in the cell consists of protein.

(b)Protein consists of DNA and is stored in the cell.

(c) DNA controls the formation of protein in the cell.

(d) The cell consists of DNA and protein.

8- In the plant cell, the nucleic acid (RNA) transfers to the cytoplasm through the……..

(a) Endoplasmic reticulum.

(b) Pores of the nuclear membrane.

(c) Cell membrane.

(d) Pores of the cell wall.

9-If the pores of the nuclear membrane are absent, the formation of……………..stops.

(a) Carbohydrates (b) proteins

(c) Lipids (d) nucleic acids

10-Histone proteins are similar to the enzymes in all of the following, except

(a) Both of them are from the same type of monomers.

(B) Both of them have peptide bonds.

(c) Both of them enter in the metabolic processes.

(D) Both of them are detected by Biuret's reagent.

11- The centromere appears in…………….

(a) Chromatid. (B) Chromatin

(C) Chromosome (d) nucleoplasm.

1 Give reason for: water passes easily from the outside to the inside of the plant cell.

2-What happens if: the plasma membrane consists of one layer only?

3- What happens if: the tails that are found in the two layers of phospholipids are Hydrophilic?

4 -What is the importance of the complex lipids in the cell membrane?

5- Write what this statement indicates:

"An organic compound contains saturated lipids and it is characterized by being liquid".

6 -What is the importance of the lipid derivative in the cell membrane?

7- What happens if: the plant cell doesn't contain the plasma membrane?

8- What happens in case of: the absence of the protein molecules from the plasma Membrane? Explain your answer.

9"There is a relationship between the nucleus and the appearance of the genetic traits How far this statement is correct? With explanation.

Continue: Cell structure

Cytoplasm:-

- **Location:-**

It fills the space between cell membrane and nucleus.

- **Structure:**

It is a fluid-like substance found, composed mainly of water and some organic And inorganic substances. : It contains:-

1- Cytoskeleton:
This is a network of filaments and microtubules which:
- Acquires the cell with a support to help it to maintain its shape and form.
- It helps to transport different substances from a place to another inside the cell.

2- Cell organelles:
- They are various structures in the cytoplasm.
- They are divided into two types:
Membranous and Non-membranous organelles.

Non-membranous organelles	Membranous organelles
They are not surrounded by a Membrane. **Such as:** - Ribosomes - Centrosome	They are surrounded by a membrane. **Such as:** - Endoplasmic reticulum. - Golgi body - Lysosomes. - Mitochondria. - Vacuoles. - Plastids.

A Non-membranous organelles:-

1 Ribosomes

• **Description**	- Rounded – shaped non-membranous organelles.
• **Function**	- Synthesizing protein in the cell.
• **Location**	- **Some** present freely in the cytoplasm and **most** of them present on the Surface of the endoplasmic reticulum. **A-Free ribosomes in the cytoplasm:** - They are single or in clusters - **They produce proteins directly into the cytoplasm** where the cell uses it In its vital processes as growth, regeneration and others. **Ribosomes found on the outer surface of endoplasmic reticulum:** - **They produce proteins as enzymes that transported by endoplasmic** **Reticulum to outside of the cell** after making changing to them.

2 Centrosome

• **Structure**	It consists of 2 tiny particles called **centrioles**. Each centriole consists of **(9) groups** of microtubules Arranged in **triples** in cylindrical shape. Centrosome Two Centrioles
• **Function**	It plays an important role in: 1- **Cell division**: where the spindle filaments extend between the 2 centrioles present at each Pole of the cell. The centrioles withdraw the chromosomes towards The cell poles. 2- **Formation of flagella and cilia**.
• **Location**	**- It is located near the nucleus in:** The animal cells (except the nerve cells) and in some fungi cells. **- It is not present in:** The cells of plant, algae and most fungi where these cells contain **a region of Cytoplasm** performing the same Function instead of centrosome.

B Membranous organelles:-

1 Endoplasmic reticulum

• **Description**	It is a network of membranous canaliculi it extends through all parts of cytoplasm
• **Location**	It extends through all the parts of the cytoplasm and attaches to the nuclear Envelope and the cell membrane.
• **Function**	1- It forms an internal transferring system that transfers substances from a Part to another inside the cell. 2- It transfers substances between the cytoplasm and the nucleus.
• **Types**	There are 2 types: 1- Rough endoplasmic reticulum 2- Smooth endoplasmic reticulum

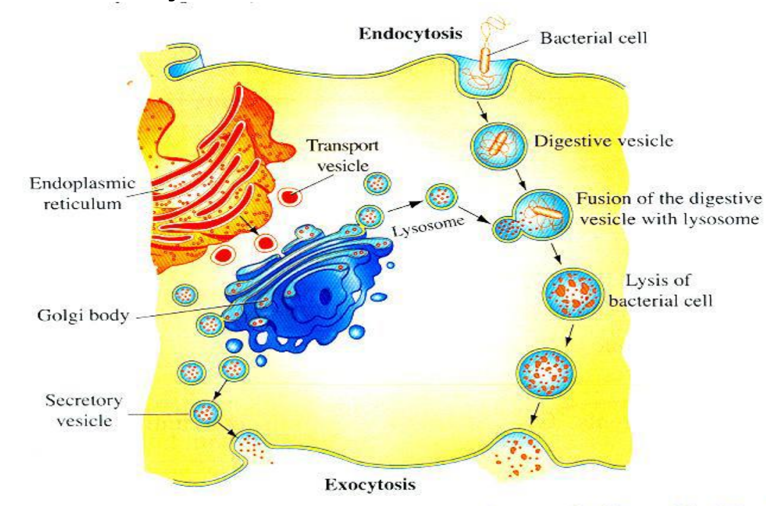
	Rough endoplasmic reticulum	**Smooth endoplasmic reticulum**
Ribosomes	Large number of ribosomes present On its outer surface.	Absent from its outer surface
Function	1- Synthesis of proteins. 2- Making changes in proteins produced by Ribosomes. 3- Making new membranes in the Cell.	1- Synthesis of lipids. 2- Transform glucose into glycogen. 3- Modifying the nature of some toxic chemicals to reduce their toxicity
Presence	It increases in the cells lining the stomach and endocrine	It increases in hepatic (liver) cells **Because** the liver cells convert glucose

	glands as these cells are responsible for secretion of enzymes And hormones	into glycogen that stored in liver and also some toxic compounds are converted into less Toxic ones in liver.

2 Golgi body (Golgi apparatus)

• **Description**	It is a number of flat membranous round-ended sacs. - It is known in animal's cell as **Golgi complex.** - In plants and algae as **dictyosomes**
• **Number**	- Its number in the cell differs according to the cell`s secretion activity Where **it increases in the glandular cells**.
• **Function**	It receives the molecules secreted by endoplasmic reticulum through a group of **transporting vesicles.** - It classifies and modifies these molecules. - It distributes these molecules to the places where they are used inside the cell, or it may pack them inside **secreting vesicles** (**lysosomes**) which move toward the cell membrane where the cell expels them to outside as **secretory product**
• **Location**	They are found in all types of cells (animals and plants)

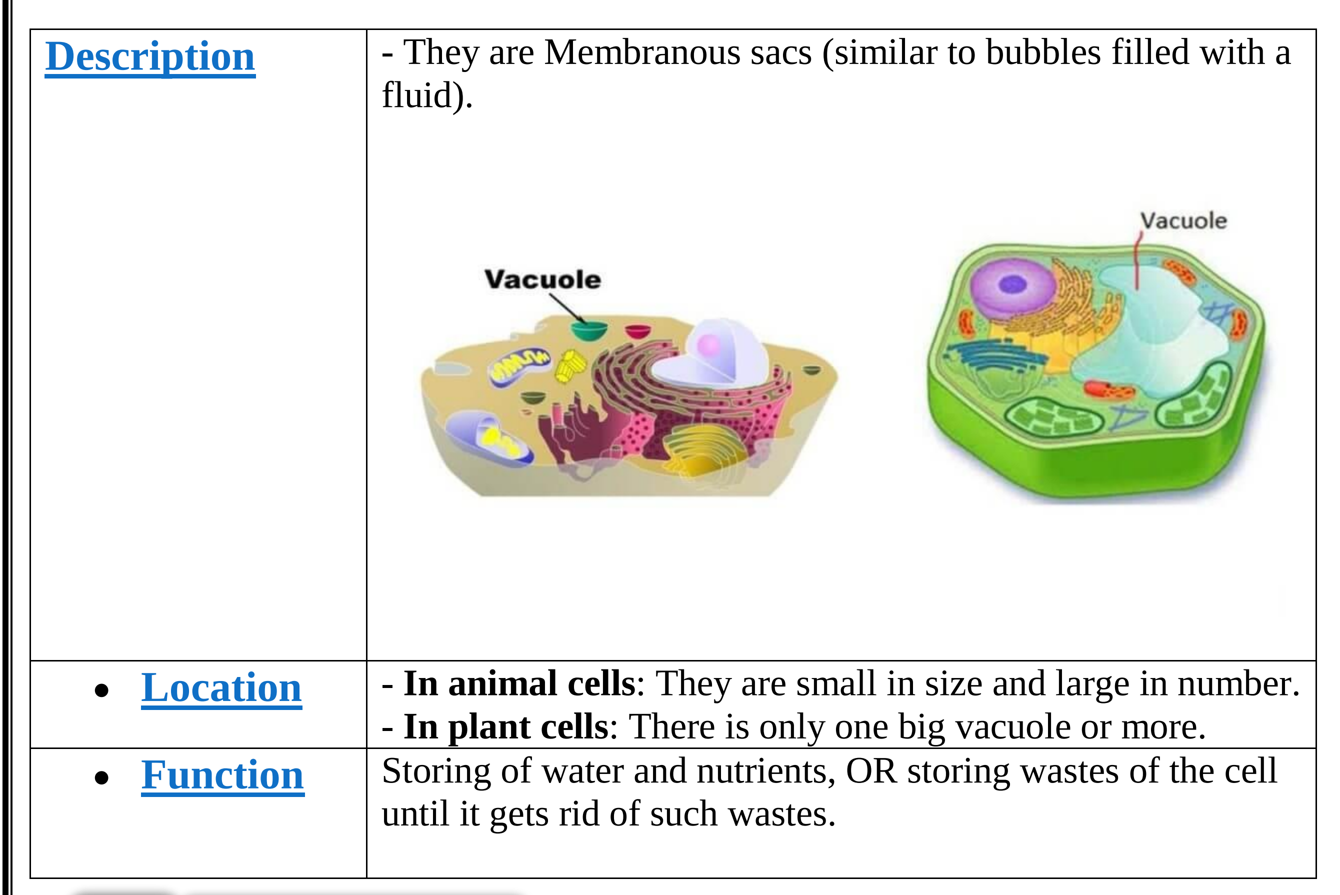
3	Lysosomes

Description	- They are small, rounded and membranous vesicles. - Formed by Golgi bodies and contain a group of digestive enzymes, called lysosome enzymes  Role of lysosomes in digesting and lysing the pathogens inside a white blood cell
Function	1- **Getting rid** of worn out and senile cells and organelles Which have no longer benefits to the cells. 2- **Digestion** of large molecules of nutrients engulfed by the cell and changing them into simplest substances that the cell can make benefit From them. **Example**: White blood cells (corpuscles) use the enzymes of lysosomes to Digest and destroy the pathogens (microbes) which invade the cell.

4 Mitochondria

• **Description**	They are sac-like membranous organelles. Mitochondria Structural Features Inner Membrane Outer Membrane Cristae Matrix Figure 1
• **Structure**	**1-Cristae**: They are a group of folds that extend from the inner membrane into the matrix 2- Matrix is surrounded by a double membrane (outer and inner). **to** increase the inner surface area on which the chemical reactions that Produce energy take place.
• **Number**	Their number increases in muscular cells **to** increase the production of energy needed by the muscles.
• **Function**	1-They represent the centres of energy production in the cell (the energy storehouse in the cell),because: 2- They are considered the main storehouse for the respiratory enzymes in the cell. 3- They are the storehouse for ATP compounds necessary to store energy resulting from oxidation of nutrients especially glucose, and the cell can extract this energy from ATP molecules once more

5 Vacuoles

Description	- They are Membranous sacs (similar to bubbles filled with a fluid). 
• Location	- **In animal cells**: They are small in size and large in number. - **In plant cells**: There is only one big vacuole or more.
• Function	Storing of water and nutrients, OR storing wastes of the cell until it gets rid of such wastes.

6 Plastids

• Description	They are various shaped membranous organelles.
• Location	They are present in plant cells only and
• Types	There are three types of plastids, differ from each other's depending on **the type of pigment that presents in each of them.**

	1- Leucoplasts **2-** Chromoplasts 3- Chloroplast		
	Leucoplasts	**Chromoplasts**	**Chloroplasts**
Colour	**(white or colourless plastids)**	**colored plastids**	**green plastids**
Pigment	Do not contain any pigment	Carotenoid pigments (their colour varies between red, yellow and orange)	Green chlorophyll pigment.
Function	They work as centres for Storing starch.	They give the plant or its parts contain them its Characteristic Own colour.	Photosynthesis, where the chlorophyll transforms light energy into chemical energy and stores them in chemical bonds Of glucose sugar.
Location	- Roots of sweet Potatoes. - Stems of Potatoes. - Internal leaves Of cabbage.	Petals of flowers. - Fruits. - Roots of some plants such as rapeseed	- Leaves and stems of green plants.

- **Structure (of the chloroplast)**:-

It is composed of:
a- A **double envelope** (membrane) consists of outer and inner.
b- A matrix called **stroma**.
c- Compact layers of shaped-like structures called **thylakoids**; each group of them is called **granum**, grana are found inside the stroma

1-Which of the following organelles is less affected by a lipid solvent?

(a) Plastid. (b)Lysosome.

(c)Ribosome (d) Mitochondrion.

2-From the organelles which are not found in the green algae is /(are)………………….

(A) Ribosomes. (b) Mitochondria.

(c) Dictyosome (d) centrosome.

3- The organelle that participates in increasing the number of cells is

(A) Centrosome (b) Golgi body.

(c) Lysosome. (d) Ribosome.

4- Which of the following plays an important role in the plant cell division?

(a) Ribosome (b) Mitochondria.

(c) Cytoplasm. (d) Centrosome.

5-The opposite figure illustrates a unicellular living organism that Lives

In pond and fresh swamp water and moves by the structure (X)

Which is formed by the help of the …………………

(a) Lysosome. (b) Ribosome.

(c) Chromosome. (d)centrosome

6- All the following are produced by the endoplasmic reticulum, except………………

(a)DNA (b) proteins.

(c) Glycogen. (D) Lipids,

7- Which of the following functions in the cell is not affected by the absence of The endoplasmic reticulum...

(a)The formation of cell secretions.

(b) Protein synthesis.

(c)Energy production.

(d)The connection between the cell parts.

8-The different substances move in certain passages inside the cell, which organelle(s) Determine these passages……………………….

(a) Golgi bodies. (b)Endoplasmic reticulum.

(c) Mitochondria (d) Lysosomes.

9- Smooth endoplasmic reticulum is abundant in the cells of the…………….

(a) liver and muscles.

(b) Stomach and liver.

(c) Stomach and muscles.

(D) Brain and muscles.

10-The largest amount of ribosomes is present in the cells that produce

(a)Lipids. (b) Glycogen.

(c) Cellulose. (D) Proteins.

11- Which of the following cells contains a larger amount of lysosomes?

(a)White blood cell. (b) Muscular cell.

(c)Red blood cell. (d)Nerve cell.

12- The part if it is removed, the cell is still diving, but it becomes exposing to pathogens, is the………………..

(a) Smooth endoplasmic reticulum. (b) Nucleus.

(c) Mitochondria (d) lysosome.

1 -Explain:

• Ribosomes participate in the growth of the living organisms.

•Ribosomes play an important role in the cell

2 -What are the polymers that their presence is affected by the absence of ribosomes in cell?

3-The animal cell loses is ability to divide, in case of the absence of lysosomes".

How far this statement is correct with explanation.

4-The number of microtubules in the centrosome is 27 tubules".

How far this statement is correct? With explanation.

5-Compare between centrosome and centromere. "In terms of: location- function"

6-The vacuoles are not found in the cells of a plant leaf".

How far this statement is correct? With explanation.

7 -Endoplasmic reticulum participates in the synthesis of fatty acids in the cell". How far this statement is correct with explanation.

8- Give reason for: the presence of rough endoplasmic reticulum increases in the stomach Lining cells and endocrine gland's cells

9 Liver reduces the sugar level in blood and decreases the toxins in the body. Explain this

Organization of living organisms

- **The body:-**

- The body of the living organism is composed of a group of **systems** which integrate and organize together
Example: Circulatory, skeletal, muscular, nervous, digestive, excretory, respiratory and reproductive systems.

- **The system**

- It is composed of a group of **organs** work together.
Example: - The circulatory system which consists of the heart, the blood and the blood vessels.

- **The organ**

- It is composed of a group of tissues work together to perform certain functions.
Example: - The heart which consists of 3 different tissues:
1- The cardiac muscular tissue.
2- The nervous tissue.
3- The connective tissue.
All of them collaborate together to pump the blood from the heart to all the body parts.

- **The tissue**

- It is composed of a group of **cells** specialized in their work.

Example: The cardiac muscular tissue of the heart is composed of cardiac muscular cells There are two types of tissue:-

A **Simple tissue:**

It consists of **one type** of cells, which are symmetrical in their structure, shape and function.

B **Compound tissue:**

It consists of **more than one type** of cells: **Tissues are varied depending on:**

- The difference on the living organism.
- Their vital activities
-The functions they perform.

The plant tissues

A- Simple tissues: Such as:

1- **Parenchyma tissue**.
2- **Collenchyma tissue**.
3- **Sclerenchyma tissue**

B- Compound (complex) tissues: Such as conductive (vascular) tissues:

1- **Xylem tissue**.
2- **Phloem tissue**.

- **First: - Simple tissues**

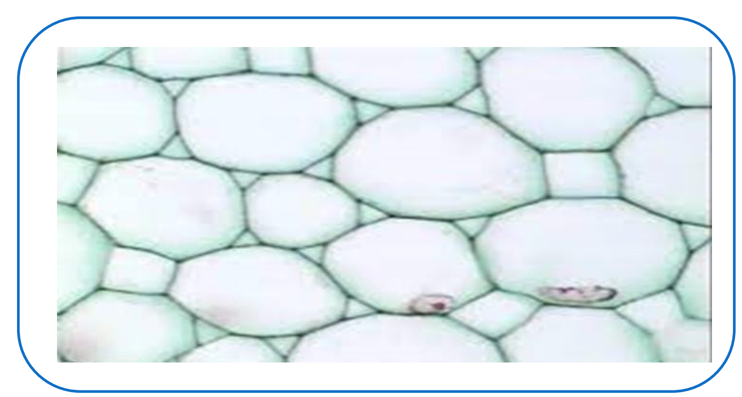
1 Parenchyma tissue

- **Description**

- Living tissue.
- Its cells are, oval or rounded cells with thin and elastic walls.
- There are intercellular spaces for aeration.
- The cells contain chloroplasts, chromoplasts or leucoplasts.
- Contain one big vacuole or more, filled with water and salts

- **Function:**

1- Do photosynthesis
2- Aeration
3- Storing nutrients(e.g.) starch



2 Collenchyma tissue

- **Description**

- Living tissue.
- Its cells are somewhat rectangular shaped.
- Their walls are irregularly thickened with **cellulose**.

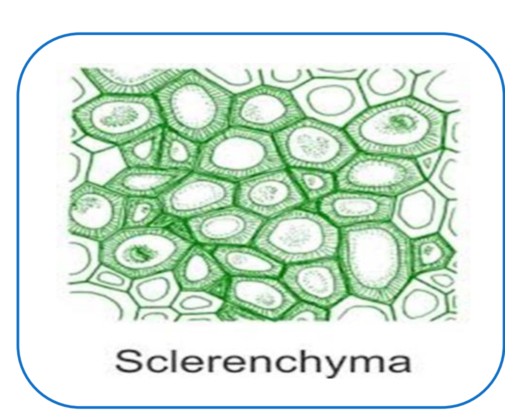


- **Function:**

- Supporting the plant by acquiring it a **suitable elasticity**

3 Sclerenchyma tissue

- **Description**



- **Non-living tissue**.
- The walls of its cells are thickened by **lignin** substance.

- **Function:**

- Strengthening and supporting the plant.
- Acquiring it the **hardness** and **elasticity**.

- Second: **Compound tissue:-**

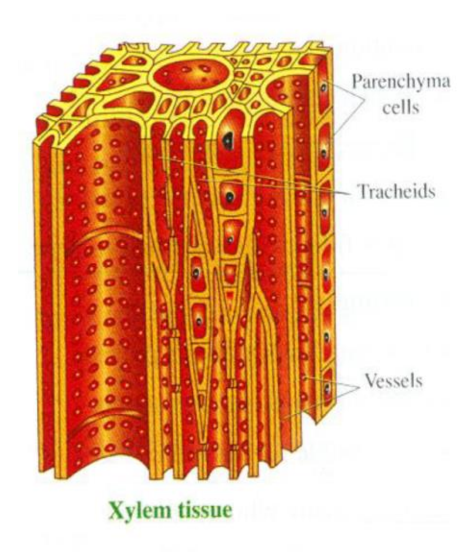
Such as conductive or vascular tissues:
- **They are two types**: Xylem tissue and Phloem tissue.
- **Their function is**: transportation

1 Xylem tissue

It is composed of xylem vessels, trachieds and parenchyma cells.
The vessels:
- They are hollow tubes, each of them is made up of a vertical raw of cells, where:
• Protoplasm and transverse walls were disappeared.
• Lignin substance was deposited on their walls from the inside and the cells are Converted into long wide vessels.
• The length of the vessels ranges from few centimetres to several meters as in high trees.
The trachieds:
• Each one of them is composed of one cell where:
The protoplasm disappeared from it and its walls get lignified.

- **Function of xylem:**

1- Transporting water and salts from the root to the stem and leaves.
2-Supporting the plant.



Xylem tissue

2 Phloem tissue

It is composed of sieve tubes and companion cells.

- **1-The sieve tubes:**

They originate from vertically compacted cells above each other.

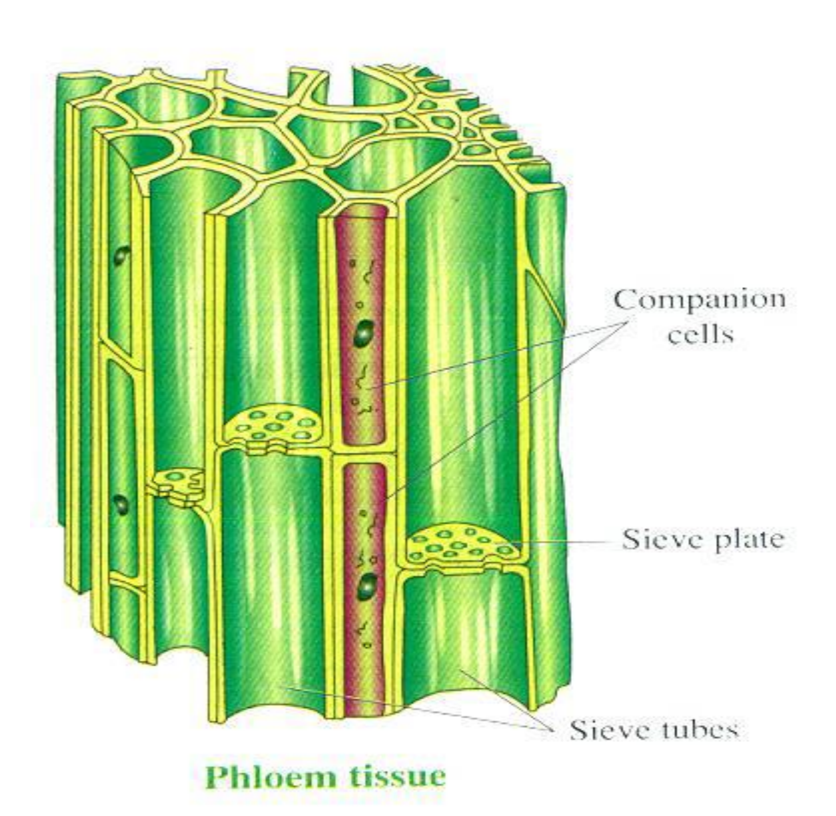
- Their nuclei disappeared and their separating walls became perforated, so They are called sieve plates, to allow the passage of cytoplasm through them in the form of cytoplasmic strands.
- Cytoplasmic strands passes through the pores between sieve tubes.

- **2-The companion cells:**

- They are living cells located adjacent to the sieve tubes to provide them With energy they require to perform their function.

- **Function of the phloem:**

Transporting the nutrients produced in photosynthesis, from the leaves to the other plant parts.



Phloem tissue

1-Phloem tissue contains sieve tubes and companion cells, the sieve tubes provide the companion cells with the energy needed to transfer the product of the photosynthesis from the leaves to all the plant parts

(a) The two statements are correct.

(b) The first statement is correct and the second statement is wrong.

(c) The first statement is wrong and the second statement is correct.

(D) The two statements are wrong.

2-"Parenchyma tissue performs the photosynthesis process to form the glucose, “The plant Stores the glucose temporarily in the plastids found in it",

(a) The two statements are correct and related.

(b) The two statements are correct and not related.

(c) The first statement is correct and the second statement is wrong.

(d) The first statement is wrong and the second statement is correct.

3-The inability of the sieve tubes to produce energy, due to the absence of the…………….

(A) Nucleus (b) cytoplasm.

(c) Cell membrane (d) mitochondria.

4- Which of the following are found in the structure of the conductive vascular tissue for the soil salts................................

(A) Sieve tubes only. (b) Tracheid only.

(c)Companion cells only. (d) Sieve tubes and companion cell:

5- The plant tissue whose cells are thickened by the cellulose substance only and it Supports the growing plant parts, is the…………….

(a) Parenchyma tissue. (b) Collenchyma tissue.

(c)Xylem vessels (D) Sclerenchyma tissue

6--The opposite figure represents a group of plant tissues in

A stem of the higher plant, study it, then answer:

(1) The tissue that is responsible for

The aeration is no…………………………..

(a)(1) (B) (4)

(c)(3). (d) (2).

(2) Tissue (1) may be found in…………………………..

(A) Potato tuber. (b) Pear fruit,

(c) Parsley stems (d) No correct answer.

7-if you know that the fibres of linen are characterized by their ability to bear the tensile which of the following tissues do you believe that they are formed of?

(a)Parenchyma tissue. (b) Sclerenchyma tissue.

(c)Xylem tissue (d) Phloem tissue.

8- Which of the following contains a nucleus.......................

(a)Vessels. (b)Tracheids.

(c)Companion cells. (d)Sieve tubes.

9-The product of the photosynthesis process in the plant transfers through……………

(a) Tracheids. (b) Vessels

(c) Parenchyma cells. (d) Sieve tubes.

1-Companion cells contain mitochondria" How far this statement. is correct? With explanation

2- Explain: xylem works as a supporting tissue for the plant.

3- Explain: xylem tissue is necessary for the plant life.

4-What happens if:-

a-The lignin is deposited on the sieve plates of the phloem tissue.

b-The pores of the sieve plates in a phloem tissue of a certain plant are blocked.

5-What happens in case of: the absence of the mitochondria from the phloem tissue in higher plants?

6-"There is a relationship between the phloem tissue and the photosynthesis process". How far this statement is correct2 with explanation.

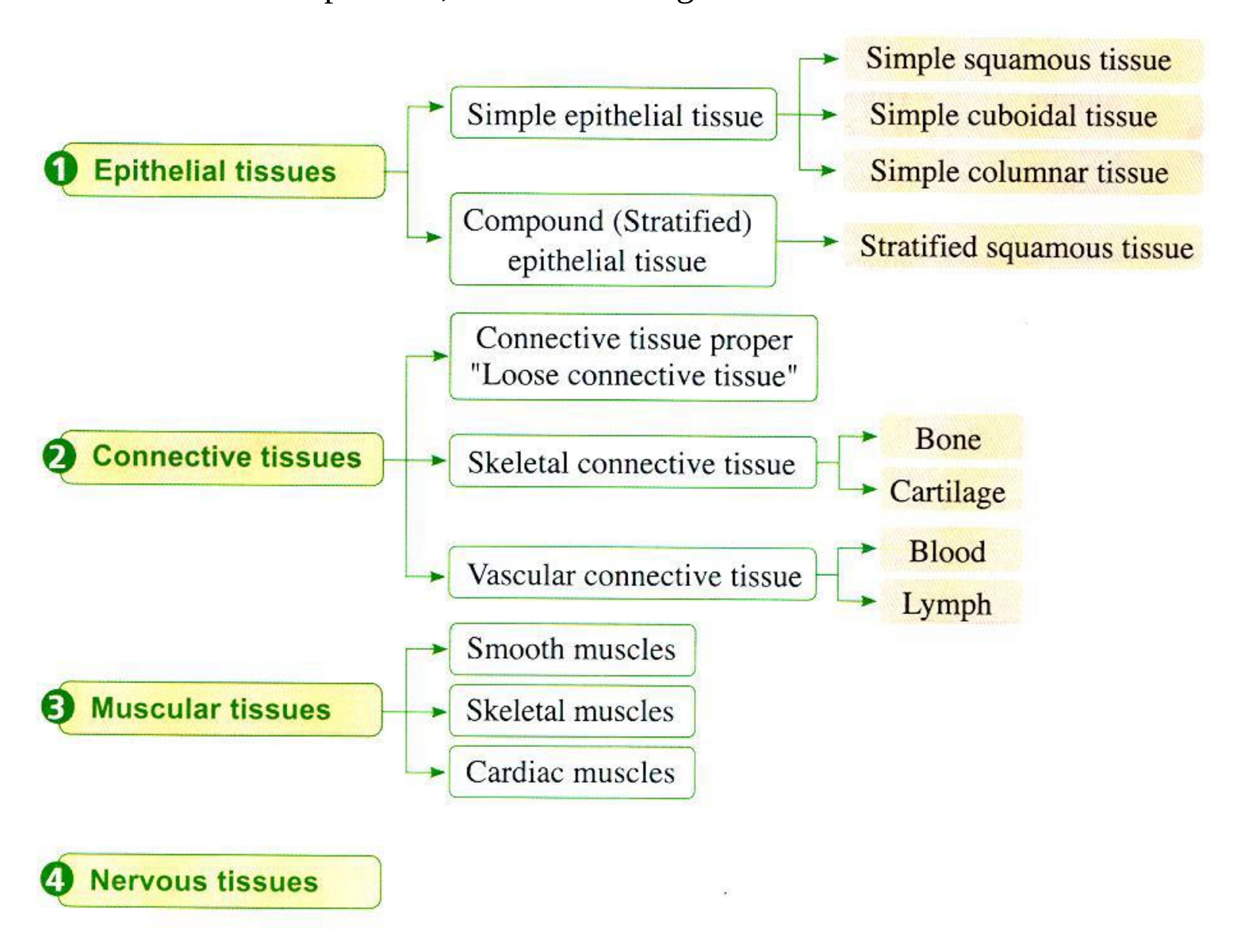
7 What happens in case of a the absence of intercellular spaces from the parenchyma tissue

8-What happens if: the plant is devoid of the parenchyma tissue?

9- What happens if: the plant is devoid of the sclerenchyma tissue?

Differentiation of cells and diversity of Animal tissues

Animals tissues can be differentiated into 4 basic types, each of them matches with the function it perform, as the following:



A Epithelial tissue:

- **Location:**

They cover the outer surface of the body and line the body internal cavities.

- **Structure:**

They are composed of a great number of closely adjacent cells connected by little interstitial (intercellular) substance.

- **Functions:**

They perform different functions, depending on their site in the body,
Such as:
1- **Absorbing water and digested food**, as the lining of digestive canal.
1- **Protecting the cells which they cover** from drought and pathogens (As microbes), as in the skin epidermis.

3- **Secreting the mucus** that makes the cavities they line smooth and moist, as in the digestive canal and trachea.

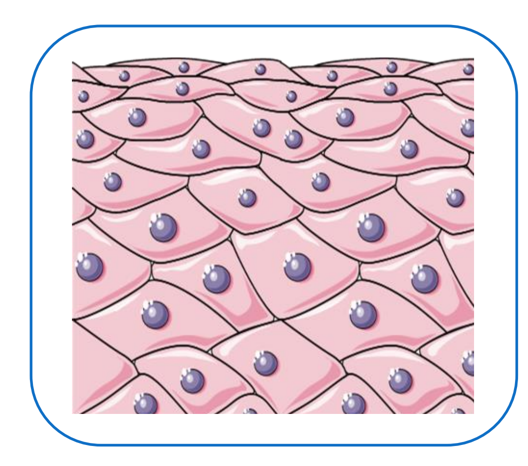
- **Types**: There are two main types according to their shape and structure:

1-Simple epithelial tissues.

2-Compound epithelial tissues.

First:- Simple epithelial tissues.

Its cells are organized in one layer, such as:



1 Simple squamous tissue

- Its cells are flattened.
Examples: the lining wall of the blood capillaries
And the wall of alveoli in lungs.



Simple cuboid tissue

- Its cells are cuboid.

Example: the lining of the kidney tubules.



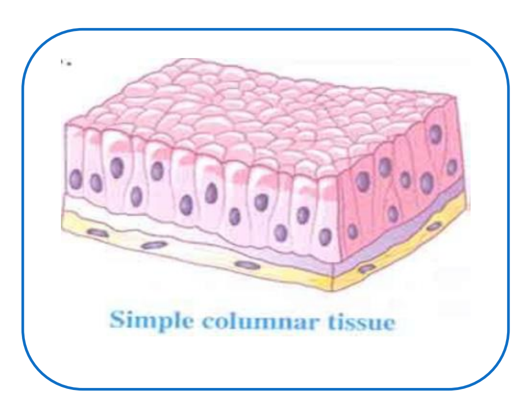
Simple cuboidal tissue



Simple columnar tissue

- Its cells are columnar.

Example: the lining of the stomach and intestine



Simple columnar tissue

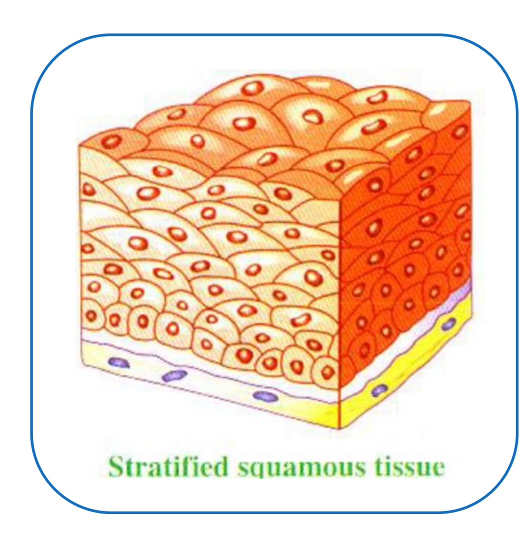
Second: Compound epithelial tissues.

Its cells are organized in several Layers.
Example:



The stratified squamous tissue

Which consists of several layers of
Compact cells above each other's, its
Surface layer is squamous, as the
Tissue of skin epidermis



Stratified squamous tissue

B Connective tissue:

- **Description:**

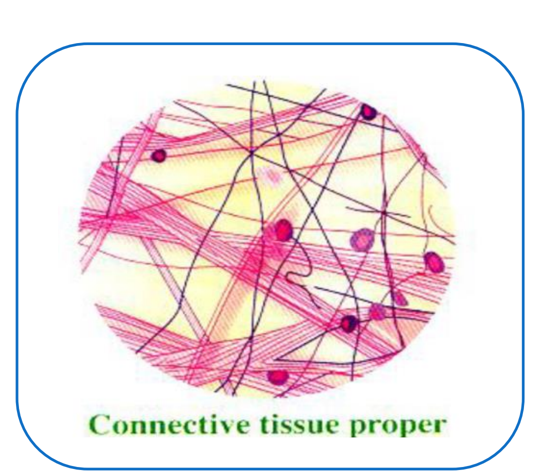
- They are made up of somewhat distant cells that immersed in an intercellular Substance that may be fluid, semi-solid or solid.

- **Types:**

There are 3 types according to the kind of the intercellular substances

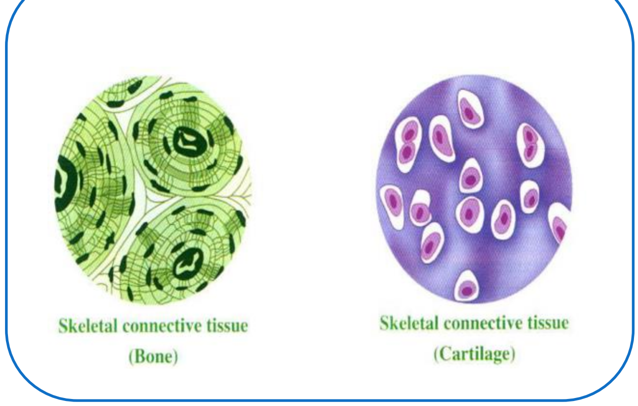
1 Connective tissue proper

- It gathers between Being fairly solid and Quite elastic.
Function:-Connecting the Different body tissues and Systems with each other, So it is widely spread.
Examples: The dermis of Skin and the mesenteries



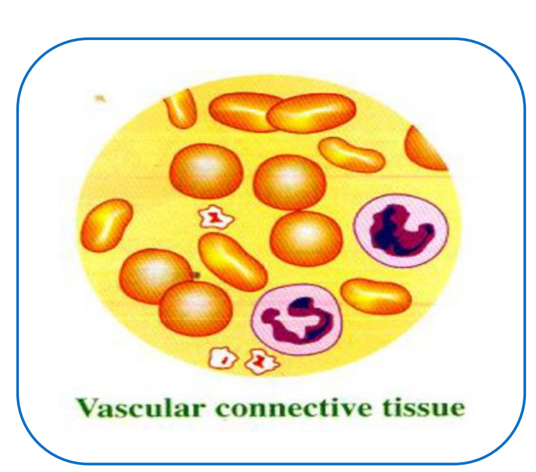
2 Skeletal connective tissue

- Its intercellular substance Is solid in which calcium Deposits in case of bones.
Function: Supporting the Body.
Examples:
Bones and cartilage.



3 Vascular connective tissue

Its intercellular substance is Fluid.
Function: Transporting the Digested food and the Excretory substances
.Examples: Blood and lymph



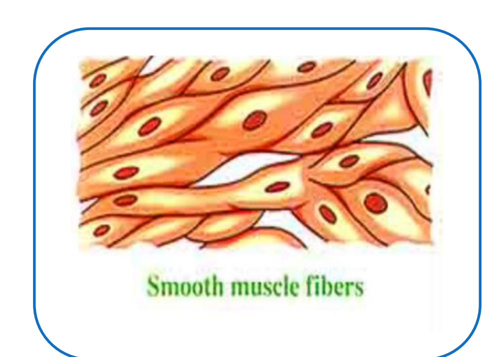
c Muscular tissue:

- **Description:**

- They are made up of cells known as muscular cells or muscle fibers.
- The cells are characterized by their ability of contraction and relaxation, so this helps the organism to move.

- **types** :There are 3 types

1 Smooth muscle



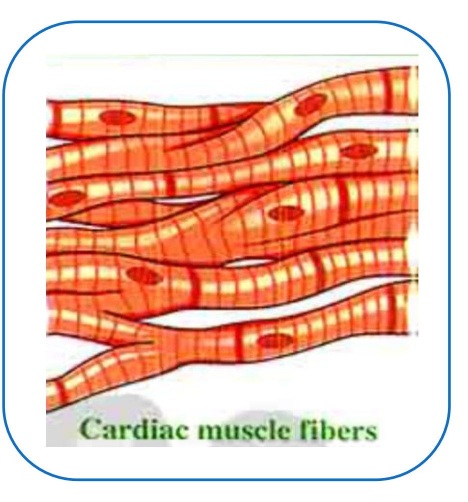
- Muscle fibres are
Unstriated and involuntary.
Its presence:
- -Present in the wall of the
Digestive canal, urinary
Bladder and blood vessels

2 Skeletal muscle



- Muscle fibres are striated
And voluntary.
Its presence:
- Usually connected with the
Skeleton, such as muscles of
The arm, legs and trunk

3 Cardiac muscle



- Muscle fibres are striated and
Involuntary, they contain
Intercalated discs that bind
The muscle fibres together
And make the heart beats in a
Rhythmic way as one Functional unit.
- Its presence:

- Present in the heart wall only.

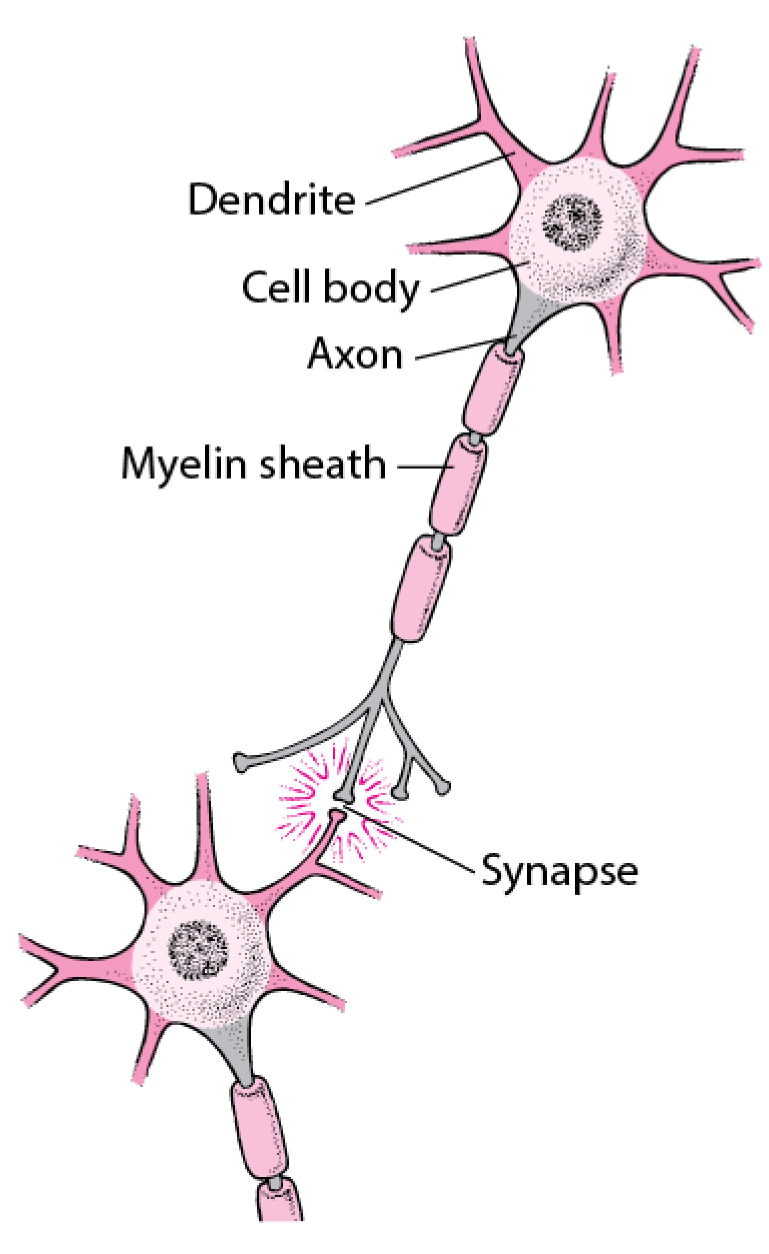
D Nervous tissue

- **Description:**

- They are made up of cells known as nerve cells or neurons.
- Neurons: are the building and functional units of the nervous system.

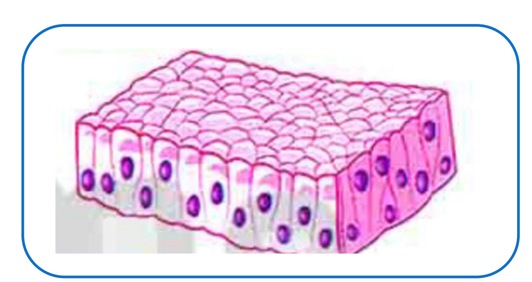
- **Function:**

- Receiving the internal and external sensory stimuli and conduct them to the brain and the spinal cord
Then transmitting the motor impulses to the effector organs
(Muscles or glands)
Therefore nervous tissues are responsible for organizing different activities of the body.



1- The opposite figure represents the structure of

a tissue that is present in…………………system



(a) Urinary

(b) Respiratory

(c) Circulatory

(d) Digestive

2-The opposite figure represents the Structure

Tissue that is present in…………………..System.

(a) Urinary

(b) Digestive

(c) Nervous

(d) Respiratory

3-The absorption of the glucose in small intestine takes place through………………. Epithelial tissue cell

(A) Simple cuboidal

(b) Simple columnar

(c) Simple squamous

(D) Compound

4-Cartilaginous rings forming the trachea are from the tissues that are devoid of calcium and they are from the tissues that perform the……………………

(a) Support.

(b) Sensation.

(c) Transportation

(d) Digestion

5-An infant suffers from a severe decrease in calcium element, which of

The following is more affected……………..

(a) The body length.

(b)Skin colour.

(c)The hair length.

(d) Eye colour.

6-The opposite graph illustrates the degree of hardness of

Degree of hardness of three animal tissues, which of the following represents

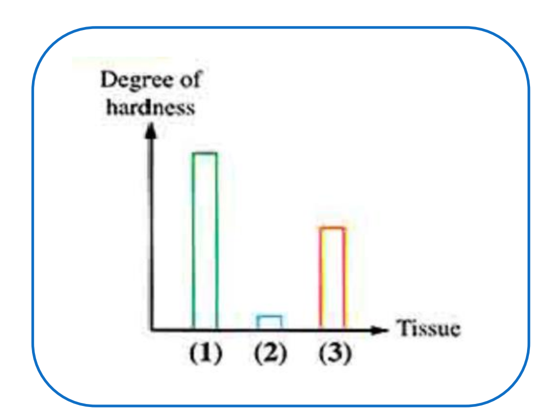
The bones and cartilages respectively?

(a)(2) and (1)

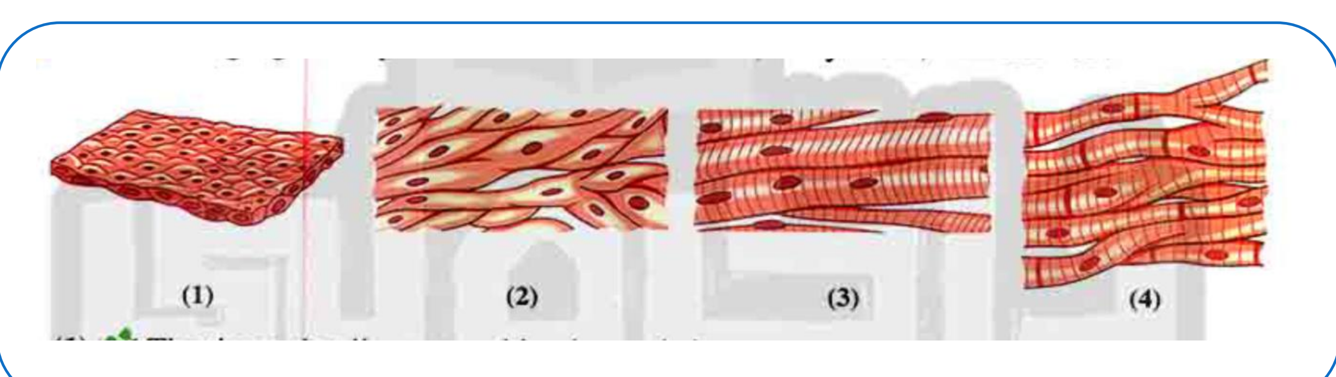
(b)(1) and (3).

(c)(3) and (1).

(d)(1) and (2).



7-The following figures represent some animal tissues, study them, and then answer:



The tissue that lines some blood vessels is no…………………

(A) 1 (b) 2

(c) 3 (D) 4

(2) The tissue that is found in the walls of the blood vessels is no…………………..

(a)1 (b) 2

(c) 3 (D)4

(3) The tissue that is responsible for the movement of the back region is no……………

(a)(2) (b)(1).

(c)(3) (d)(4).

The tissue that is responsible for the movement af blood inside the blood

Vessel is no………………

(a)(1) (B) (2)

(c) 3) (d) (4)

(5) The tissue containing structures that makes the organ found in it act as one functional unit is no……………………..

(a)(2). (b) (1).

(c)(3). (d) (4).

6- Skeletal muscle cells are characterized by all of the following, except that

(a) They store glycogen.

(b) They contain a large number of mitochondria.

(c) They are cylindrical in shape.

(D) They contain intercalated discs.

1-Give reason for: the epithelial tissues cover the body surface externally.

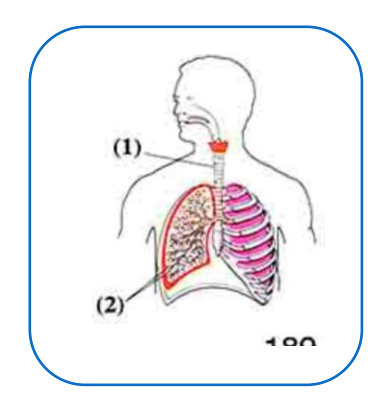
2- If you know that the circulatory system consists of heart. Blood vessels and blood.

3-In the light of your study, illustrate the types of the tissues that are found in

The components of the circulatory system.

4-The opposite figure illustrates the respiratory

Sean in human, study it then answer:



(a) Illustrate the type and the importance

Of the tissue that is found in structure no. (1)

(b) Illustrate the type of the tissue that is

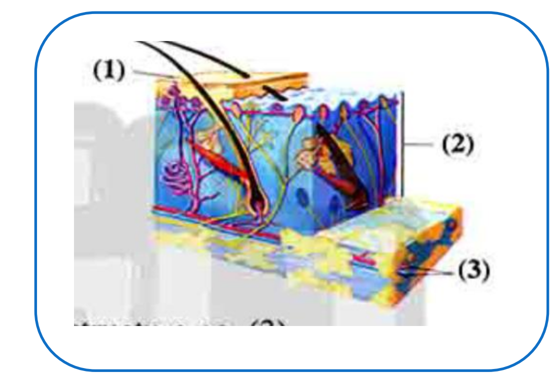
Found in the wall of structure no. (2)

5 -What happens if: the intercellular substance of the vascular connective tissue is changed?

6 -What happens in case of: the deposition of calcium in the intercellular substance of the cartilage tissue?

The opposite figure illustrates a section in

The human skin, study it, then answer:



(a) What is the type of the tissue that is found in no? (1)?

(b) What is the type of the tissue that is found in no? (2)?

7- When playing a football, the most muscles that are under control are the smooth muscles" How far this statement is correct? With explanation.

8 -Give reason for: the bones are harder than the cartilages.

9- Give reason for: naming the skeletal muscles by this name.